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LEADERSHIP SELF-EFFICACY: MEASURING
THE EFFECTS OF LEADERSHIP TRAINING
AT SQUADRON OFFICER SCHOOL

THESIS

Gilbert W. Jennings, Captain, USAF

AFIT/GSM/LSR/91S-14

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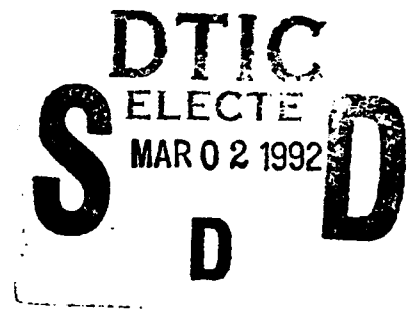
DEPARTMENT OF THE AIR FORCE
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**LEADERSHIP SELF-EFFICACY: MEASURING THE EFFECTS OF
LEADERSHIP TRAINING AT SQUADRON OFFICER SCHOOL**

THESIS

**Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology**

Air University

**In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Systems Management**

Gilbert W. Jennings, B.S.

Captain, USAF

September 1991

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By now, I can write no more about the work of this thesis. Instead, I would much rather thank those who have been most helpful to me during the past fifteen months.

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Gilbert W. Jennings

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Abstract

This study used a measure of change in perceived self-efficacy as a method for evaluating the effectiveness of the leadership training conducted at the Air Force's Squadron Officer School (SOS), Maxwell Air Force Base, Alabama. A self-assessment survey was developed to measure the change in perceived self-efficacy related to leadership behaviors of the students when they compare themselves to their idea of an ideal leader/manager. Dr. Gary A. Yukl's (1989) taxonomy of leadership skills was used as the leadership model in the development of the survey instrument. A statistical analysis was done to determine which of Yukl's skills showed the greatest amount of change as a result of attending SOS. Results indicate SOS had a positive impact on students in eight of eleven skills defined by Yukl's (1989) taxonomy. When the eleven skills were condensed into four broad categories described by Yukl (1989), there was significant improvement in three; giving and seeking information, making decisions, and influencing people. Building relationships, did not show a statistically significant improvement. Regrouping the skills to coincide with Henry Mintzberg's (1980) ten managerial roles, the leader role showed significant improvement, while the managerial roles exhibited an insignificant change.



LEADERSHIP SELF-EFFICACY: MEASURING THE EFFECTS OF LEADERSHIP TRAINING AT SQUADRON OFFICER SCHOOL

I. Introduction

General Issue

Each year the Air Force sends approximately 3700 of its eligible officers to school for professional military education at Maxwell Air Force Base, Alabama. The special course is formally titled Squadron Officer School and is known throughout the Air Force as "SOS." Each officer selected for promotion to the rank of captain is given the opportunity to attend the formal seven week training program to help develop his or her own leadership abilities. The school was established in 1952 to train the Air Force's company grade officers (officers in the rank second lieutenant through captain) at a point in their career when they would be transitioning from a learning/following role to a leadership role. Recent changes in Air Force policy limited the entrants of students to those in the rank of captain. The school provides the officers with a variety of learning experiences including speaking, writing, field sports, war games, classroom instruction, and social events. The students are trained in use of

various management and leadership techniques using the classroom, field, and laboratory experiences.

Specifically, through the study of military leaders (sometimes termed "Warrior Leaders"), face to face encounters with national heroes, laboratory training situations, and classroom instruction, SOS provides training to each student in an effort to help them become better leaders. A question exists of how much improvement in leadership results from the intense training of SOS. Each unit which gives up a productive person for seven weeks has to be concerned with the potential gain to be expected. The general task of this thesis was to determine if a measure of the effects of SOS training on its student's leadership can be developed.

Specific Problem Statement

If an instrument could be devised to measure changes in self-efficacy toward a specific task or set of tasks, useful feedback could be given to the developers of programs for leadership training. More specifically, training could be tailored to fit the needs and desires of the institution as programs, policies, and leaders change. For example, if SOS desired to further develop its programs around, "Building Relations" or "Making Decisions," the school's faculty could use the survey to determine if the two areas had been strengthened following changes to the program.

There are three major questions which this thesis attempted to answer. First, can a valid instrument be developed to adequately measure the changes in perceived self-efficacy of SOS students? Second, does SOS

have an effect on the self-efficacy of its students in regard to leadership skills and competencies? Third, does the degree of change in perceived self-efficacy differ across the various leadership/management skills?

Theoretical Basis For Research

This research was based on two theories, one dealing with leadership and the second dealing with perceived self-efficacy.

The leadership taxonomy of Dr. Gary Yukl (1989) was used as the reference for leadership skills. In an effort to provide a reasonable reference of desirable leadership skills of which to measure self-efficacy against, Yukl's (1989) integrating taxonomy has been chosen. This integrating taxonomy can be divided into four broad categories of leadership: giving and seeking information, making decisions, building relationships, and influencing people.

Additionally, this thesis used the theory of self-efficacy which has been developed by Dr. Albert Bandura (1977) of Stanford University. The change in the students self-perceived capability to successfully be or perform as a leader resulting from attendance at SOS is what has been measured. Self-efficacy theory postulates that people increase in their willingness to deal with (become involved with) new situations as perceived self-efficacy increases (Bandura, 1977). If SOS was effective in improving the leadership abilities of its students, then that improved willingness to accept leadership challenges should be reflected in a change in perceived self-efficacy.

Hypotheses

The first hypothesis was that a reasonable instrument can be developed for use in measuring the perceived self-efficacy of SOS students. Self-assessments have been shown to be reliable in the social science field (Mabe & West, 1982; Harris & Schaubroeck, 1988; Farh & Dobbins, 1989; Thornton, 1980; Fox & Dinur, 1988; Schunk, 1989 and 1985; Trentham, Silvern, & Brogdon, 1985; Greenwood, Olejnik, & Parkay 1990). Through the use of a self-assessment instrument changes in self-efficacy will be measured.

The second hypothesis was captains who attend SOS will experience a change in perceived self-efficacy. Bandura (1977) argues that any experience can lead to a change in perceived self-efficacy. He holds that self-efficacy can be effected in four ways: performance accomplishment, vicarious experience, verbal persuasion, and emotional arousal. The change can be effected either positively or negatively to both greater and lesser extents through the four means. Therefore, changes in self-efficacy are expected, and the change is expected to be positive which indicates an increase in perceived self-efficacy.

The third hypothesis was, there will be a differentiation across the leadership skills in the changes in perceived self-efficacy. By declaring that there will be measurable differences in the changes, a position has been established for the study of the changes that do occur.

Scope of Research

This research was not intent on redefining the terms of leadership and management or offering any new justification for the two concepts. Nor does this thesis seek to offer any new distinctive differences between the two terms. Instead the thesis utilized an accepted taxonomy of leadership skills as a standard to measure the change in perceived self-efficacy.

The analysis of the surveys does not verify that the specialized training caused the change, but only identifies a change should one occur. However, the assumption that a change was facilitated by the training can be made, but not substantiated, in light of the inability to control for the many factors associated with the social experience at SOS.

Thesis Organization

Chapter II provides the necessary background and literature review of information needed for this thesis. The chapter begins with a discussion of leadership and management and the distinction of the two concepts. A discussion of the taxonomy developed by Dr. Gary Yukl (1989) for the description of leadership skills follows. A discussion of the theory of self-efficacy as it pertains to this thesis is presented (Bandura, 1977). The final part of Chapter II will concentrate on a review of related studies on self-efficacy and self-assessment and their application to the work of this thesis.

Chapter III explains the methodology used in the development and implementation of the research. It starts with a description of the research questions and their related hypotheses. Operational definitions are given to help the reader understand the language used in this thesis. A complete description of the survey instrument and the rationale used for its development is given. Topics such as selection of the population, field procedures, and controls and weaknesses are also contained within this chapter. Other issues, such as how and under what conditions the instrument was administered, are described in this chapter. The chapter concludes with a description of the development of the statistical programs used to analyze the gathered data.

Chapter IV presents the end results of the data analysis. Many tables and graphs are presented to help the reader understand the significance of the numbers.

Chapter V closes the thesis with a discussion of the conclusions of this research and recommendations for the future.

II. Background

Introduction

The purpose of this chapter is to provide the reader with a better understanding of the theories used in this thesis. The chapter starts by addressing some of the confusion surrounding the terms of leadership and management. Then background on Yukl's (1989) leadership taxonomy which was used as a standard for measurement of leadership and management skills is reviewed. A discussion of Mintzberg's (1980) ten managerial roles and how they are related to the distinction of management and leadership roles is included. This chapter also provides information on the theory of perceived self-efficacy and the use the self-efficacy theory (Bandura, 1977) in this thesis. Finally, a review of some of the relevant works in the area of measuring self-efficacy and the usefulness of self-assessment are provided.

Leadership and Management

Leadership and management has been defined and redefined by almost every researcher who has worked in this area of the social sciences. Leadership in this paper has referred to that body of skills and actions associated with the influencing of people or organizations in pursuit of a common goal. However, there are some researchers that distinguish between the concepts of leadership and management. One of

the most prominent is Abraham Zaleznik (1977; 1983; 1990) who clearly identifies differences in the two concepts. First, he describes a manager in the following manner.

The manager was seen as a person with practical responsibilities, who sees that problems are resolved in such a way that people at different levels of responsibility will continue to contribute effectively to the organization. Managerial practice focuses on the decisionmaking process rather than the ultimate events, and managers themselves are typically hard working, intelligent, analytical, and tolerant of others. (1983, P. 86)

Conversely Zaleznik describes a leader, a wholly different person from a manager in their reasoning and being.

A leader is more interested in what events and decisions mean to people than in his own role on getting things accomplished. The atmosphere leaders create is often one of ferment, which intensifies individual motivation and often results in unanticipated outcomes. (Zaleznik, 1980:86)

Professor Sam C. Sarkesian (1985), has written on the potential differences between managers and leaders in the military environment.

Understanding the nature of leadership must surely begin with attention to the human element.

... The quality of leadership is primarily a function of the leaders' ability to motivate others in a concerted and organized response to perform duties and undertake tasks even at the risk of death. (Sarkesian, 1985:22)

Even though there may be a philosophical gap between the leader and the manager there also has to be a reckoning between the two approaches. Sarkesian (1985) believes that the two are not mutually

exclusive. Each person who wishes to become successful as a leader or a manager must still take on the attributes of the other as the situation dictates. Sarkesian was not alone in his belief that there is a need for the skills of both leaders and managers in those responsible for the organization. Holloman (1968), Turcotte (1983), Meyer (1980) all agree that there is a need for a balance of both qualities and that the balance depends upon the situation involving the leader/manager, the organization, the members of the organization, and the outside influences on the organization.

Through the years, many researchers have developed taxonomies to describe the work, activities, roles, and duties of the leaders and managers. First, there was no clear or commonly accepted definition for either term - leader or manager. This leads to the confusion over which taxonomy should be used as the "best taxonomy." Because each researcher has studied a different sector or aspect of leadership and management, each has developed a taxonomy for their special purpose. Some of the more notable research has been listed in Table 1.

Table 1. Matrix of Noted Taxonomies

Yukl	Mintzberg	Morse & Wagner	Stogdill	Bowers & Seashore	House & Mitchell	Luthans & Lockwood	Page
Supporting	Leader Role	*	Consideration	Leader Support	Supportive Leadership	*	*
Consulting		*	*	*	Participative Leadership	Motivating & Reinforcing	*
Delegating		*	Tolerance of Freedom	*	*		Supervising
Recognizing		*	*	*	*		
Rewarding		*	*	*	*		
Motivating		Motivating & Conflict Handling	Production Emphasis	Goal Emphasis	Achievement-oriented Leadership		
Managing Conflict & Team Building			Integration	Interaction Facilitation	*	Managing Conflict	
Developing			Providing Development		*	Training & Development	
Clarifying		*	*				
Planning & Organizing	Resource Allocator; Entrepreneur	Organizing & Coordinating	Initiating Structure	Work Facilitation	Directive Leadership	Planning & Coordinating	Planning & Organizing: Strategic Planning
Problem Solving	Disturbance Handler	Strategic Problem Solving	Role Assumption; Demand Reconciliation		*	Problem Solving & Deciding	Decision Making
Informing	Disseminator	Information Handling	*	*	*	Exchanging Information	Consulting
Monitoring	Monitor	*	*	*	*	Monitoring/Controlling	Monitoring Indicators, Controlling
Representing	Spokesman; Negotiator; Figurehead	*	Representing; Influencing Superiors	*	*	Interacting with Outsiders; Socializing & Politicking	Representing
Networking & Interfacing	Liaison	Managing Environment & Resources		*	*		Coordinating

(Yukl, 1989:95)

In 1973, Henry Mintzberg introduced his ten managerial roles, which have stood up well against the test of time. However, his theory does not go far enough in describing the leader. Mintzberg (1980) lists a leader's role as that part of the manager's role which deals with the managerial activities involving subordinates. According to Mintzberg the role of the leader has a dual purpose.

First, the key purpose of the *leader* role is to effect an integration between individual needs and organizational goals. The manager must concentrate his efforts so as to bring subordinate and organizational needs into a common accord in order to promote efficient operations. Second, it is in the *leader* role that managerial power most clearly manifests itself (p. 62).

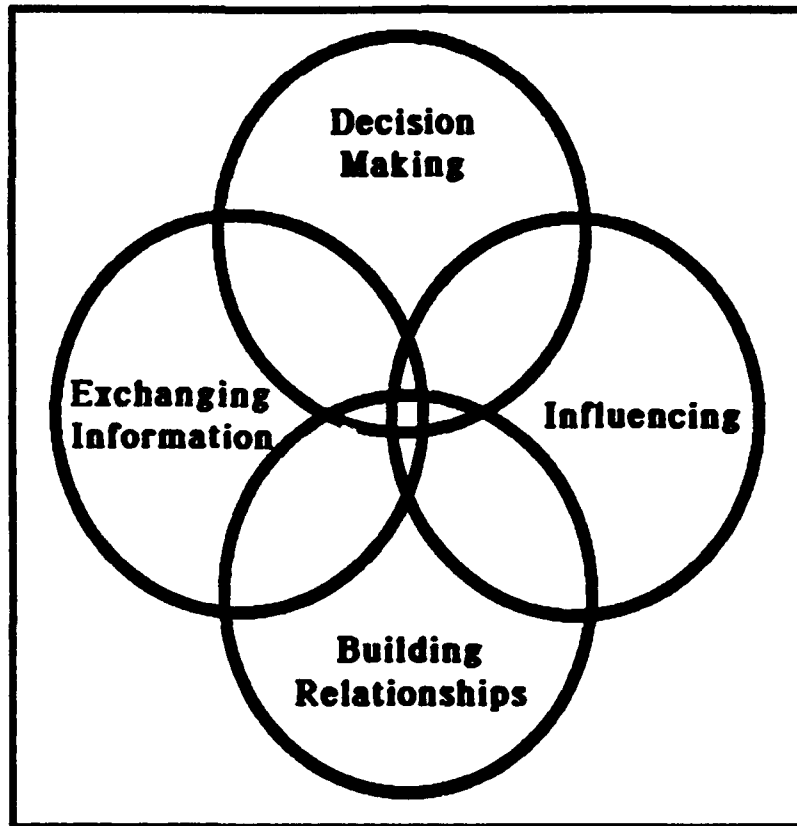
The remaining nine roles: figurehead, liaison, monitor, disseminator, spokesman, entrepreneur, disturbance handler, resource allocator, and negotiator describe the activities of the manager. Mintzberg (1980) concludes that leadership permeates all activities of the manager, but he stops short of identifying the specific details of interaction.

Mintzberg's (1980) taxonomy can be used as a means of differentiating roles or activities and skills of leaders and managers. Mintzberg makes a clear break between the roles that involve the subordinates and those that are more task oriented. Given the philosophies of Zaleznik (1977, 1983, & 1990), Sarkesian (1985), Holloman (1968), Turcotte (1983), and Meyer (1980), a dashed line can be drawn in Table 1 to differentiate between leaders and managers. Mintzberg (1980) recognizes a managerial role that deals exclusively with the subordinates

and defines that role as the leader role. However, he leaves the leader role insufficiently specified for designing evaluative research.

Mintzberg's (1980) ten roles are used to distinguish between traits of a leader and a manager. To provide a more complete description of the leadership roles and skills attention was turned to Yukl's (1989) taxonomy of leadership.

Yukl's Integrating Taxonomy. This thesis needed an integrated framework to measure all (or as many as can be reasonably defined) aspects of the leadership and management skills of the students in SOS. Dr. Gary Yukl (1989) developed an "integrating taxonomy" that seems to bridge the somewhat fluid gap between leadership and management concepts. His taxonomy is based on the assumption that leadership/management skills can be encompassed by four basic overlapping processes (Yukl, 1989). The four processes (decision making, influencing, building relationships, and exchanging information) are shown pictorially as overlapping circles in Figure 1. Yukl recognizes that these four processes are not independent or mutually exclusive. Each of the four processes can be demonstrated in a single action taken by the leader/manager in any given situation. The overlapping circles provide a good visual representation of the concept of the four primary processes. He does hedge a bit by cautioning the reader to consider the four processes as themes rather than specific guidelines. (Yukl, 1989)



**Figure 1. Yukl's Four Primary Processes in Managing
(Yukl, 1989:68)**

The matrix in Table 1 does not allow a clear distinction between the different descriptors but does point out relative similarities. The different categories are not mutually exclusive. Each of the researchers sighted in Table 1 has derived unique aspects of leadership/management through the use of different methods and for different purposes. Yukl (1989) contends that there was a convergence of evidence among the various descriptive approaches.

The Eleven Leader/Managerial Behaviors (Yukl, 1989:ch7). In the development of the "Integrating Taxonomy," Yukl has broken down each

of the four broad processes into behavior categories. Each of the eleven behaviors, or skills, are associated with one of the four broader processes as shown in Figure 2.

Exchanging Information	Making Decisions
Informing Clarifying Monitoring	Problem Solving Planning & Organizing Consulting & Delegating
Building Relationships	Influencing People
Managing Conflict & Team Building Networking Supporting	Motivating Recognizing & Rewarding

Figure 2. The Integrated Taxonomy
(Yukl, 1989:129)

What follows are the definitions of each of the eleven skills and how they interact with the internal and external environments. These are presented here to provide information on the skills which was useful in building the survey instrument in Chapter III. The definitions have been extracted directly from Yukl's text *Leadership in Organizations* (Yukl, 1989).

Networking.

Socializing informally, developing contacts with people who are a source of information and supporting and maintaining relationships through periodic interaction, including visits telephone calls, and correspondence, and attendance at meetings and social events. (p. 129)

Networking, used in the internal context, will find the person developing good relations with their subordinates. In the external context, they will be developing good relations with peers, superiors and outsiders.

Supporting.

Acting friendly and considerate, showing sympathy and support when someone is upset, listening to complaints and problems, looking out for someone's interests, providing helpful career advice, doing things to aid someone's career advancement. (p. 129)

Supporting is demonstrated internally through good relations with subordinates and a tolerance for stress by the subordinates. Good relations with peers, superiors, and outsiders are a result of the external use of supporting.

Managing Conflict and Team Building.

Encouraging and facilitating constructive resolution of conflict, fostering teamwork and cooperation, and building identification with the organizational unit or team. (p. 129)

Like the two previous skills, managing conflict and team building, develop good relations internally with subordinates, and externally with

peers, superiors, and outsiders. Furthermore, managing conflict and team building builds group cohesiveness, cooperation among subordinates.

Motivating.

Using influence techniques that appeal to emotions, values, or logic to generate enthusiasm for the work and commitment to task objectives, or to induce someone to carry out a request for support, cooperation, assistance, resources, or authorization; also, setting an example of proper behavior by one's own actions. (p. 129)

Applied internally, the skill of motivating increases subordinate efforts. Externally, motivating seeks to obtain cooperation and support from peers, superiors, and outsiders.

Recognizing and Rewarding.

Providing praise, recognition, and tangible rewards for effective performance, significant achievements, and special contributions; expressing respect and appreciation for someone's accomplishments. (p. 130)

Like the first three skills, recognizing and rewarding helps to develop good relations with the subordinates. Recognizing and rewarding develops the amount of effort a subordinate is willing to apply to the task. Recognizing and rewarding also gives clarity to the roles of the subordinate in the work environment. In the external sense, recognizing and rewarding is the same as motivating by creating cooperation from peers, superiors, and other outsiders.

Planning and Organizing.

Determining long-range objectives and strategies for adapting to environmental change, identifying necessary action steps to carry out a project or activity, allocating resources among activities according to priorities, and determining how to improve efficiency, productivity, and coordination with other parts of the organization. (p. 130)

Internally, planning and organizing works toward unit efficiency and coordination. Externally, the trend is to help the unit to adapt to the environment through external coordination.

Problem Solving.

Identifying work-related problems, analyzing problems in a systematic but timely manner to determine causes and find solutions, and acting decisively to implement solutions and deal with crises. (p. 130)

Problem solving seeks stability of operations, and unit efficiency and coordination internally. Externally, the leader/manager tries to adapt the unit or organization to the environment through external coordination.

Consulting and Delegating.

Checking with people before making changes that affect them, encouraging suggestions for improvement, inviting participation in decision making, incorporating the ideas and suggestions of others in decisions, and allowing others to have substantial discretion in carrying out work activities and handling problems. (p. 130)

When consulting and delegating, the leader/manager is concerned with the decision quality and subordinate effort in the internal

environment. Externally, the leader/manager is concerned with implementation of the decisions as well as decision quality.

Monitoring Operations and Environment.

Gathering information about the progress and quality of work activities, the success or failure of activities or projects, and the performance of individual contributors, also, determining the needs of clients or users, and scanning the environment to detect threats and opportunities. (p. 130)

Internally, the detection of problems and evaluation of performance is the task of monitoring. The detection of problems and opportunities is taking place in the external environment when one is monitoring.

Informing.

Disseminating relevant information about decisions, plans and activities to people who need it to do their work, providing written materials and documents, answering requests for technical information, and telling people about the organizational unit to promote its reputation. (p. 130)

Like consulting and delegating, informing is assuring decision quality. Like planning and organizing, informing is working for unit efficiency and performance, both in the internal environment. Externally, there is the push for external coordination and the drive to enhance the organization or units reputation.

Clarifying Roles and Objectives.

Assigning tasks, providing direction in how to do the work, and communication a clear understanding of job responsibilities, task objectives, deadlines, and performance expectations. (p. 130)

Internally, clarifying is simply working for role clarity, unit efficiency and coordination. Externally, there must be external coordination with outside groups.

The eleven skills cannot be enacted or observed individually or associated with any single given outcome. A leader's actions may be associated with more than one skill, and the outcomes may be associated with more than one category. The leaders actions are, like the taxonomy, integrated. Just as each individual sees a situation differently , each action by a leader is left up to the receiver for interpretation. Once the receiver has interpreted the message or action, he acts upon the message or action as he sees fit. Trends may be observed and then generalizations made as to how each leader and follower act and react to each other.

The concept of leadership versus management is still confused at best, but for this thesis, a distinction can be made between the two concepts by referring to Mintzberg's ten managerial roles. By association of Mintzberg's (1980) roles with Yukl's (1989) model a distinction between leadership and management can be made. Yukl's (1989) taxonomy can be used as a basis for development of a self-efficacy instrument.

Perceived Self-Efficacy

In all situations confronting any leader there are two options. First, they could ignore the problem and let events take their course without influence. Second, the leader could step up to the challenge and attempt to change the outcome. The self-perceived capability to take on a task and successfully perform a given behavior was termed self-efficacy (Bandura, 1977; 1982). Bandura (1982:122) writes, "Perceived self-efficacy is concerned with judgments of how well one can execute courses of action required to deal with prospective situations." Using Bandura's model, this thesis measures the change in perceived leadership and management self-efficacy of officers as a result of attendance at SOS.

Self-efficacy is the confidence a person has in themselves to perform a given behavior. Perceived self-efficacy can be defined as the belief that one can successfully execute the behavior required to produce the desired outcomes (Bandura, 1977; 1982). This is not a generalizable concept such as self-concept or self-esteem. Self-efficacy is associated with a specific skill or behavior. Bandura differentiates between two types of expectancy associated with his theory:

An outcome expectancy is defined as a person's estimate that a given behavior will lead to certain outcomes. An efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes (Bandura, 1977:193).

Expectation derives wholly from the belief that an outcome will occur. If a person does not have the belief that they possess the skill to affect the outcome, then they are less likely to attempt or finish the task. Individuals may not pursue an outcome if they do not see themselves as possessing the necessary skills to effect that outcome.

If a person has high self-efficacy in regard to a capability then they are be willing to attempt to become involved in an action, expending time and energy on the accomplishment of that task. The individual decides how much effort, time and trouble will be involved, weigh that against the motivations and rewards of accomplishing the task, and make a decision.

Efficacy expectations are a major determinant of people's choice of activities, how much effort they will expend, and of how long they will sustain effort in dealing with stressful situations.

...Weak expectations are easily extinguishable by disconfirming experiences, whereas individuals who possess strong expectations of mastery will persevere in their coping efforts despite disconfirming experiences. (Bandura, 1977:194)

Knowing that self-efficacy affects a person's decision to pursue a task, it becomes important to know what affects development of self-efficacy in regard to a skill. Bandura (1977) holds that efficacy is based on four information sources: performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. Each of the four sources can contribute to efficacy as well as inefficacy of individuals.

Performance Accomplishments. This source is based on personal mastery of skills through experience. One of the most influential sources of self-efficacy is derived from personal success. Bandura (1977) contends that personal success raises mastery expectations. Success experiences increase efficacy, yet failures may cause an increase of inefficacy. Failures early in the training process can lead to inefficacy, but early successes will increase one's efficacy to a point where failures do not overcome gains in efficacy from successes. At some point the efficacy gains and losses converge to a generalized level. The efficacy gained from personal experiences is also transferrable to other similar experiences, as well as other situations that are substantially different (Bandura, 1977). For example, when someone takes a test and scores a highly they will be more confident in taking another test in that subject again. In a similar way they will be more willing to take a test in other subjects as well with their increased self-efficacy.

Vicarious Experience. The belief that anyone has become a superstar baseball player solely by watching other good players play the game is doubtful. Bandura (1977) contends that through social comparison people do increase efficacy by watching others perform successfully in threatening activities. By comparing themselves to those performing the activities, the conclusion is reached "if they can do it, I can too." Because development of efficacy through vicarious experiences is less dependable than information about one's own capabilities, efficacy from a vicarious experience is also weaker and more vulnerable to change (Bandura, 1977).

Verbal Persuasion. This is the somewhat short lived efficacy of a weight lifter. While lifting the weight for the last time, his partner encourages him, persuading him of his capabilities.

People are led, through suggestion, into believing they can cope successfully with what has overwhelmed them in the past. (Bandura, 1977: 198)

This form of efficacy is also weaker than personal experiences but may provide needed encouragement to succeed at the moment, leading to increases in efficacy through experience.

Emotional Arousal. The fear that grows in a speaker's stomach just before going on stage is a form of emotional arousal. Once the knots start to form, the palms start to sweat, the heart rate increases, and the body is sending its messages to the mind about the situation, fear generates further fear and self-efficacy is effected. The anxiety caused by the events can be diminished through modeling and successful experiences. To curb emotional arousal, coping skills can be used to support one's efficacy during stressful situations. The physiological state of one situation may cause an energizing effect, in another situation, the same physiological state may cause a disabling effect (Bandura, 1977).

Perceived Self-Efficacy Illustrated. An example may help clarify the process. Bert is afraid to cross a narrow foot bridge which links two land masses divided by a deep gorge. Bert has three concerns: 1) his weight may cause the bridge to collapse, 2) he is not sure he could maintain his balance on the narrow bridge while crossing, 3) he does not

want to meet and pass someone as he crosses the bridge knowing there is only room for one-way traffic. For these three reasons Bert was held captive to his fears and will not attempt to cross the bridge. Bert's job requires him to cross the bridge so a bridge crossing instructor was sent to improve Bert's self-efficacy. First, the instructor demonstrates (vicarious experience) to Bert that the bridge will not collapse under the weight of the load by using a simulated bridge constructed between two trees over safe ground. Second, the instructor demonstrates to Bert that he has the capability by requiring Bert to cross the training bridge (performance accomplishment). The trainer was just like the real bridge, and the instructor implies that there was little difference between the trainer and the real bridge. Finally, the instructor gives Bert training in how to control his breathing and pulse rate to remain calm in times of stress (emotional arousal). Filled with excitement, Bert was ready to try crossing the bridge. The instructor stays for the big event and cheers Bert on as he crosses for the first time (verbal persuasion). With his new found capacity, Bert crosses the bridge with a sure foot.

What changed in Bert? His skills were not improved; the bridge was not widened; the floor was not braced for a heavier load; traffic lights were not installed to control traffic. The only change that took place was a change in perceived self-efficacy within Bert. He was willing to meet the new challenge with a confidence of success because his self-efficacy had improved.

The operative word is willing. The higher one's perceived self-efficacy the higher the probability they are willing to attempt a task (Bandura, 1982). If someone is experiencing positive results, increasing their self-efficacy, then they are more willing to accept a new task.

Related Studies in Self-Efficacy. One might expect to find a widely diverse set of studies in the field of self-efficacy, but the studies have not been as broad as expected. Generally, the studies in self-efficacy, relating self-efficacy to predictive capabilities of future actions, have been conducted in the field of education. Much of the research has centered around student efficacy or teacher efficacy and the predictive capability of student performance or teacher competency. These studies have generated some useful information.

One of the most interesting of the self-efficacy studies was conducted by Trentham, Silvern, and Brogdon (1985) and involved the study of teacher competency and self-efficacy. In their research, the teacher's self-efficacy was measured and then compared to the superintendent's evaluation of the teachers. The purpose of the research was to determine how teacher efficacy contributes to improvements in teacher competency.

Trentham et al. (1985) found "...efficacy can be measured reliably, and that efficacy and teacher competency as rated by superintendents are related" (p. 350). Furthermore, they found that distinction could be made between low competency and high competency teachers by using efficacy as one of the major factors. Their results were strong enough that the

researchers recommended the use of efficacy rating, "...a reliable and quickly measured variable..." in the decision process for hiring and promotion (p. 350).

Other research involving the study of teachers by Greenwood, Olejnik, and Parkay (1990) measured teachers' self-efficacy and compared it to the Wilson Stress Profile for Teachers (WSPT). What the researchers found was that teachers with high self-efficacy exhibited lower levels of stress than teachers with low self-efficacy. The authors report "...teachers experience less stress when they have confidence in their abilities and believe that they, as well as teachers in general, can make a difference" (Greenwood et al., 1990:105).

Dale Schunk (1985, 1989) has not only accepted the fact that self-efficacy effects the learning process, but he has made steps to define methods of teaching that enhance self-efficacy. Schunk (1985) finds increases in learning self-efficacy also increase the desire to learn more.

Efficacy and outcome expectancies influence [the] student's motivation (i.e., effort expenditure, and persistence), which, in turn, promotes task success and skill development. (Schunk, 1985:211)

In summary, all articles reviewed for this thesis have been positive in their reports on the use and measurement of self-efficacy. One such article states that self-efficacy lends itself well to scientific study of traits. Gorrell (1990:79) writes in his conclusion: "Since self-efficacy theory is concerned with perceived efficacy related to specific performances in

specific situations, instruments typically are developed for the tasks in question."

Self-Assessment

The first review of self-assessment starts with an article by George Thornton (1980). Thornton found no clear indication that self-appraisal should be used for administrative decision making; however, he does sight some significant correlations in regard to the appraisals. First, he sights two studies which found that expectancy theory predicts cognitive performance better than objective performance. A reason given by Thornton was that for expectancy theory a persons performance is more directly a function of their motivational force. He also suggests that self-appraisals should be used for research purposes to provide a unique perspective on job performance. Thornton finds lower halo effect and concludes that intra-individual strengths and weaknesses are being diagnosed more completely. Halo effect is the generalization from one outstanding personality trait to an overly favorable evaluation of the whole personality (Websters New Collegiate Dictionary, 1977). This low halo effect "...implies a better diagnosis of each individual's training needs" (Thornton, 1980:268). When using self-appraisals for job selection, he reports, "...self-appraisals may tap unique sources of information about the applicant. The relative lack of halo would provide better diagnosis of an applicant's individual strengths and thus provide for better placement decisions" (Thornton, 1980:268).

A study completed by Fox and Dinur (1988) complements Thornton's (1980) work agreeing that there was little evidence that self-assessment is ready for use in the personnel selection process. They did regard the self-assessment as valid but low in significance in the study which they performed. Fox and Dinur also found low halo effect in the measurement of their subjects - 357 males age 18-19 being screened for a prestigious military course. Their study pursued the use of self-assessment as a means of personnel selection which proved to be a weak use of self-assessment. Fox and Dinur did find that the same self-assessment can be used to gain a "wide range of information difficult to obtain from other sources," and it can be gained with relative ease with low cost (Fox & Dinur, 1988:592).

The last two articles reviewed for this thesis focus on the use of social comparison in the administration of a self-assessment. Mabe and West (1982) found a significant increase in validity of self-appraisals if social comparison was used. By using a standard to gage themselves, the subjects submitting to the self-assessment improved in their ability to provide constant correlation with other measures. Mabe and West (1982) also reported that maintaining anonymity of the subjects contributed to accuracy of the self-assessments.

Farh and Dobbins (1989) provide information relating directly to the use of social comparison. They tested two hypothesis relating social comparison and self-ratings. Their work showed promising results for the

requirement of social comparison by the subjects (Farh & Dobbins, 1989).

Farh & Dobbins (1989) provide the following explanation:

The social comparison explanation proposes that CPI [comparative performance information] enhanced the accuracy of self-ratings by providing ratees with common and more accurate frame-of-reference concerning the meaning of high, medium, and low performance. (p. 608)

Summary

Many of the important works in the fields of self-efficacy, leadership, management, and self-assessment have gone into the work completed in this research. Using the works of those mentioned in this chapter a plan of action was laid out. This plan forms the methodology used in the preparation, administration, and analysis of the research done. The next chapter describes the methodology used and the reasoning and rationale used for its development.

III. Methodology

Introduction

This chapter discusses the methodology used in the development of the research of this thesis. It starts with the three research questions and their associated hypotheses. The methodology used for the development of the survey instrument is covered in some detail. Once the instrument was designed, a full analysis plan was developed to provide the data to answer the research questions. The last section describes the weaknesses and controls of the research method used.

The Research Questions and Their Related Hypothesis

The first research question was stated as: Can a reasonable instrument be developed to measure perceived leadership self-efficacy?

Hypothesis one: A valid instrument can be developed to measure perceived leadership self-efficacy in this environment. Researchers (Bandura 1977, Schunk, 1985 & 1989; Greenwood et al., 1990; Trentham et al., 1985) have successfully measured self-efficacy, however, this research was different from their works. The concept of the measurement remains the same and does not contradict their work.

The second research question was: Does SOS have an effect on the perceived self-efficacy of its students in regard to the leadership skills of Yukl's (1989) leadership taxonomy?

Hypothesis two: Attendance at SOS does improve the perceived self-efficacy of its students in their leadership and management skills. The research does not provide information on how the self-efficacy is improved, only that it was or was not improved. Additionally the research does not explain SOS's role in changing the perceived self-efficacy of the students. An assumption was made that attendance at SOS causes the change to occur even though the change may be caused by occurrences from outside the school environment.

The third research question was more qualitative: Will there be a distinguishable difference in the amount or relative changes that occur across the various skills?

Hypothesis three: There will be a difference in the changes in the various skills. This thesis will not be able to justify the differences, and it will not be able to explain the differences. this research will only show that different amounts of change in perceived self-efficacy occurred in the skills.

Before the actual methodology is discussed, it is important that the reader understand some basic terms associated with the study.

Definitions

Change in Perceived Self-Efficacy - The difference between the self-efficacy score for a particular skill of the students finishing SOS and the self-efficacy score for the same skill of the students starting SOS. The scores were measured on a seven-point Likert scale.

Flight - At SOS the class of 600 or so students are assigned to smaller groups called "flights." Each flight consists of approximately thirteen students. The students are selected and assigned to the flights based on the best possible mix in diversity in terms of jobs, age, and athletic abilities. The assignment to the flight was made by the faculty in the second or third day of SOS.

Flight Instructor - A member of the faculty responsible for the overall instruction of the student flights.

Leadership or leadership Skill - Refers to those skills associated or correlated with Yukl's (1989) leadership model described in Chapter II.

Leader Role - As described in Chapter II, Mintzberg's (1980) leader role can be associate with Yukl's (1989) skills of supporting, managing conflict and team building, motivating, recognizing and rewarding, consulting and delegating, and clarifying.

Management or Management Skill - Those roles associated with Mintzberg's (1980) ten roles excluding the leader role. Yukl's skills associated with Mintzberg's (1980) nine management roles are

networking, planning and organizing, problem solving, monitoring, and informing.

Original Order - The first survey developed is referred to as the "original order" survey. The questions are in an original order where the alternate survey reversed the order of the same questions.

Perceived Self-Efficacy - A scalar measurement of how the students feel about their abilities to perform specific tasks toward a successful outcome. Measured on a seven-point Likert scale.

Reverse Order - A survey developed by reversing the order of the questions asked on the original ordered survey.

Skill (SK_n) - One of the eleven behavioral skills taken from Yukl's (1989) taxonomy as discussed in Chapter II for detailed definition of each of the eleven behaviors. SK_n refers to the skill number. Each skill listed in Chapter II was given a SK number as a variable name for use in the computer programming. The list of skills, their SK numbers, and their associated questions are listed in Table 2.

In an effort to resolve any confusion about the skills and their associated questions on the survey, the skills, their definitions, and their associated questions are listed below. The questions are retained in the form as they appeared in the survey. At the top of each page of questions, the following introductory phrase was printed: "By comparison to the ideal leader/manager I...." Each question begins with this phrase. What follows

are the skills with their definitions and associated self-efficacy questions taken from the original order questionnaire.

Table 2. Skills and Behaviors

Skill Number	Behavior	Associated Questions
SK1	Networking	23 & 33
SK2	Supporting	14, 18, 28 & 36
SK3	Managing Conflict & Team Building	22, 34 & 38
SK4	Motivating	13, 25 & 37
SK5	Recognizing & Rewarding	15 & 26
SK6	Planning & Organizing	20 & 31
SK7	Problem Solving	24 & 29
SK8	Consulting & Delegating	12 & 32
SK9	Monitoring Operations & Environment	19 & 30
SK10	Informing	16, 21 & 35
SK11	Clarifying Roles & Objectives	17 & 27

Networking - Socializing informally; developing contacts with people who are a source of information and support; and maintaining relationships through periodic interaction, including visits, telephone calls, correspondence, and attendance at meetings and social events.

23. ... maintain regular correspondence (telephone, visits, social events, etc) with others who have contact with my work unit _____% as effectively as the ideal person.

33. ... maintain good relationships with superiors, peers, and outsiders in order to obtain necessary resources and support for my work unit _____% as effectively as the ideal person.

Supporting - Acting friendly and considerate, showing sympathy and support when someone is upset, listening to complaints and problems, looking out for someone's interests, providing helpful career advice, and doing things to aid someone's career advancement.

- 14. . . . show friendly and supportive behavior toward work unit members _____% as effectively as the ideal person.**
- 16. . . . enhance information flow from outside the work unit to the members of my work unit _____% as effectively as the ideal person.**
- 28. . . . look out for the interests of others, providing helpful career advice, and aiding people in career advancement _____% as effectively as the ideal person.**
- 36. . . . show sympathy and support when someone is upset _____% as effectively as the ideal person.**

Managing Conflict and Team Building - Encouraging and facilitating constructive resolution of conflict, fostering teamwork and cooperation, and building identification with the organizational unit or team.

- 22. . . . facilitate cooperation and teamwork among the members of my work unit _____% as effectively as the ideal person.**
- 34. . . . promote identification within my work unit making each member a part of the group _____% as effectively as the ideal person.**
- 38. . . . promote and emphasize cooperation and cohesiveness within my work unit _____% as effectively as the ideal person.**

Motivating - Using influence techniques that appeal to emotions, values, or logic to generate enthusiasm for the work and commitment to task objectives; to induce someone to carry out a request for support,

cooperation, assistance, resources, or authorization; and setting an example of proper behavior by one's own actions.

- 13. ... say things, inspiring and stimulating enthusiasm for the work of the group _____% as effectively as the ideal person.
- 25. ... say things to inspire and build others confidence in their ability to perform assignments successfully _____% as effectively as the ideal person.
- 37. ... provide a good role model by setting a good example of proper behavior through my actions _____% as effectively as the ideal person.

Recognizing and Rewarding - Providing praise, recognition, and tangible rewards for effective performance, significant achievements, and special contributions; expressing respect and appreciation for someone's accomplishments.

- 15. ... create positive rewards and give praise or recognition to my work unit members with good performance showing appreciation for their special efforts and contributions _____% as effectively as the ideal person.
- 26. ... make sure credit is given to my work unit members for their helpful ideas and suggestions _____% as effectively as the ideal person.

Planning and Organizing - Determining long-range objective and strategies for adapting to environmental change, identifying necessary action steps to carry out a project or activity, allocating resources among activities according to priorities, and determining how to improve efficiency, productivity, and coordination with other parts of the organization.

20. . . . develop plans to avoid problems and develop procedures for reacting to unavoidable problems/crises _____% as effectively as the ideal person.
31. . . . efficiently organize and schedule short term work plans for my work unit in advance _____% as effectively as the ideal person.

Problem Solving - Identifying work-related problems, analyzing problems in a systematic but timely manner to determine causes and find solutions, and acting decisively to implement solutions and deal with crises.

24. . . . propose solutions to serious or unexpected work-related technical problems _____% as effectively as the ideal person.
29. . . . act decisively, to deal with technical work related problems when a prompt solution is needed _____% as effectively as the ideal person.

Consulting and Delegating - Checking with people before making changes that affect them, encouraging suggestions for improvement, inviting participation in decision making, incorporating the ideas and suggestions of others in decisions, and allowing others to have substantial discretion in carrying out work activities and handling problems.

12. . . . delegate important tasks and decisions to individuals in my work unit _____% as effectively as the ideal person.
32. . . . consult with the work unit and allow them to share in the decision making process _____% as effectively as the ideal person.

Monitoring Operations and Environment - Gathering information about the progress and quality of work activities, the success or failure of activities or projects, and the performance of individual contributions;

determining the needs of clients or users, and scanning the environment to detect threats and opportunities.

- 19. . . . stay informed about the progress of activities within my work unit _____% as effectively as the ideal person.**
- 30. . . . check on the performance of my work unit members and their project successes _____% as effectively as the ideal person.**

Informing - Dissemination of relevant information about decisions, plans, and activities to people who need it to do their work, providing written materials and documents; answering requests for technical information, and telling people about the organizational unit to promote its reputation.

- 16. . . . enhance information flow from outside the work unit to the members of my work unit _____% as effectively as the ideal person.**
- 21. . . . represent my work unit, promoting or defending its interests. I do this when communicating with superiors, or other groups and individuals outside of my work unit _____% as effectively as the ideal person.**
- 35. . . . provide superiors, peers, and outsiders with important information from my work unit that could support their decision making process _____% as effectively as the ideal person.**

Clarifying Roles and Objectives - Assigning tasks, providing direction in how to do the work, and communication a clear understanding of job responsibilities, task objectives, deadlines, and performance expectations.

- 17. . . . set specific, realistic performance goals, informing others of their duties and responsibilities, letting them know what is expected of them _____% as effectively as the ideal person.**

27. . . . specify the rules and policies (written or unwritten) which must be observed by members of my work unit _____% as effectively as the ideal person.

General Research Methodology

The methodology can be reduced to three significant parts: the environment, the experiment, and the analysis. Each of the three areas are discussed separately in this section.

The Environment. To answer the research questions a field study was conducted at SOS with the students. The field study focuses on the SOS leadership training program, which has been designed specifically to develop leadership skills. The current SOS program has been refined to the point where minimal changes occur from class to class.

The population from which the samples are chosen could be defined as all Air Force captains, since all Air Force captains are offered the opportunity to attend SOS. The sample population used was made up entirely of Air Force officers who attended SOS in classes 91D or 91E. Class 91D started on April 29, 1991 and finished on June 14, 1991. Class 91E started July 8, 1991 and finished on August 23, 1991.

The Experiment. The methodology required a pre-test and post-test of the classes to measure the change in the perceived self-efficacy. A survey series was developed and administered in a quasi-experimental design using both classes. The quasi-experimental design used a separate-sample pretest-posttest for analysis. The quasi-experimental design does

not require the researcher to have total control over the experiment. However, there must be control over one or two of the major factors. There are three major factors which can be controlled: when the observations are made, when the treatment was applied, and which group receives the treatment. The separate-sample design requires that both samples be subjected to the treatment, but the treatment of one sample must have no effect on the other (Huck, et al., 1974).

No control group was used since no one in the sample did not attend SOS (receive the treatment). This series required a post-test of class 91D, a pre-test of class 91E, and a post-test of 91E. The three tests could be used to determine if a single posttest could be compared to the tests of a benchmark class which had been given both a pretest and posttest to determine if self-efficacy had improved.

Because of time constraints, this research used only the posttest of 91D and the pretest of 91E for study in this thesis. The study of the second posttest of class 91E is ongoing. At the time of this writing the data from the posttest of class 91E has not been obtained.

The Analysis. The analysis was completed on a VAX model 6000-420 using SAS version 6.06. SAS is a copyrighted product of SAS Institute Inc., Cary, North Carolina. All manipulation of the data, other than appending files, was completed in SAS programs. Appending of files was done on the VAX system using the "APPEND" command. The analysis was completed in four parts. First, the data was read from the optically scanned scoring sheets and put into forms which could be used in the

computer programs. Second, the instrument was assessed for reliability and internal consistency using the SAS analysis program. Third, the data was assessed for its normality and adverse correlation factors using the SAS analysis program. The data was also analyzed using frequency tables, histograms, and regression analysis. Fourth, the responses to the survey were studied using a T-test to determine the extent of the differences or changes in perceived self-efficacy.

Development of the Survey Instrument

The instrument used for the survey was made up of three parts; 11 demographic questions, 27 self-efficacy assessment questions, and 3 general assessment questions. The 38 questions take approximately ten minutes to complete. The survey was produced in two versions, an original order and a reverse order. Each of the three sections, and the reverse order survey, will be discussed.

The survey consisted of a cover letter and the six pages of the instrument in a booklet form. The scores were recorded on an optically scanned answer sheet. Each flight consisted of approximately thirteen students. Fifty packages of thirteen tests and answer sheets were sent to the school for distribution. The details of the distribution and collection are covered in the field procedures section.

The development of this instrument surfaced two significant problems: first, the need to break down Yukl's eleven behaviors into usable, bite sized pieces; second, creating a scale that did not have a

statistically small central tendency. The first step was to build the self-efficacy self-assessment questions. Second, a reliable scale had to be developed. The following sections discuss how these two tasks were treated.

Developing Self-Efficacy Questions. Developing self-efficacy questions seemed quite simple, requiring only the restating the definition of the eleven behaviors into a straight forward self-assessment question. Quickly the problem became obvious, each behavior had too many aspects in its definition and had to be reduced to a simpler form. To accomplish this the definitions were broken into two or more significant parts. Each significant part was translated into a self-efficacy self-assessment question.

Validation of Self-Efficacy Questions. Once the self-efficacy questions and the self-rating scales were developed they were examined by a panel of English and social science experts to obtain expert congruence between the questions and the attributes being measured. The panel was given the twenty-seven questions and a copy of the definitions and explanations to the behaviors from Yukl's (1989) model. They were asked to read each question and assign it to a behavior. They were told that each behavior would have two to four matching questions. From the panels evaluation of the survey questions, there was agreement on all of the questions except question Q16 and Q18. These two questions had been inconsistently placed with behaviors other than their intended behavior.

Because of the confusion caused by the poorly worded questions, a decision was made to try alternative skills without the questions and other skills with the addition of questions. The two questions, Q16 and Q18, were associated with skills SK10 and SK2 respectively. Q16 was assigned by the panel to SK1 and SK6. Q18 was assigned by the panel to SK6, SK9, and SK11. Two approaches were used to determine what skills, if any, to assign the two odd questions. The first approach used the questions in their originally intended skills. The second approach added or deleted the ambiguous questions from the skills as indicated in Table 3 on the next page. For example, SK1B was the same as SK1, but with question 16 added to the skill per the assignment made by the expert panel who reviewed the questions. In the same manner SK2B was the same as SK2, but SK2B has had question 18 removed from its composition.

A matrix of original skills was used in the analysis along with all possible combinations of the use of Q16 and Q18. The decision of how to use the questions and which skill they should or should not be assigned to was based on the reliability of the scale as measured by Cronbach's alpha found for each of the skills. Cronbach's alpha is a method similar to the split-halves method (Carmines & Zeller, 1979). It is defined as "the squared correlation between the observed value and the true value T (SAS, 1990:213)." In other words, Cronbach's alpha is a measure of error between the average estimate relative to a true score (Hull & Nie, 1981).

Table 3. Associated Alternative Skills

Skill Number	Behavior	Associated Questions
SK1	Networking	23 & 33
SK1B		SK1 +16
SK2	Supporting	14, 18, 28 & 36
SK2B		SK2 -18
SK3	Managing Conflict & Team Building	22, 34 & 38
SK4	Motivating	13, 25 & 37
SK5	Recognizing & Rewarding	15 & 26
SK6	Planning & Organizing	20 & 31
SK6B		SK6 +16
SK6C		SK6 +18
SK6D		SK6 +16+18
SK7	Problem Solving	24 & 29
SK8	Consulting & Delegating	12 & 32
SK9	Monitoring Operations & Environment	19 & 30
SK9B		SK9 +18
SK10	Informing	16, 21 & 35
SK10B		SK10 -16
SK11	Clarifying Roles & Objectives	17 & 27
SK11B		SK11 +18

Deciding which question to retain with which skill was accomplished by weighing the value of each question and its contribution to Cronbach's alpha of each skill. If the question increased the Cronbach's alpha by a significant amount for a particular skill, then there was an alternative skill added to the list to include the additional question. Likewise, if the Cronbach's alpha did not decrease by a significant amount, in the case of removal of a question, then an alternate skill was added, excluding the question from the original skill. This exercise was

accomplished after the first survey had been sent to SOS for the posttest. Therefore, all the questions, including Q16 and Q18, were kept in the questionnaire.

Scale Development and Instrument Testing. Several attempts were made to develop a rating scale that would measure, at significant levels, the perceived self-efficacy of the students taking the survey. The first attempt, using the full definition of each behavior, asked the subject to assess their capabilities to successfully perform a task. They were to grade themselves on a ten point scale ranging from (1) "low" to (10) "very high." Figure 3 shows the ten-point scale as it appeared in the trial survey.

1	2	3	4	5	6	7	8	9	10
low									very high
<p>On a scale of 1 to 10 rate yourself as to how confident you are with your own personal ability to...</p>									

Figure 3. Ten-Point Rating Scale

The first survey was submitted to a small sample group of captains selected at random from the school at the Air Force Institute of Technology (AFIT). The tests yielded a significant central tendency. Even with a lengthy instruction assuring the intended examinee of anonymity and that low answers were perfectly acceptable, the results

yielded only a narrow deviation. This narrow deviation from the mean was considered unacceptable.

First, based on comments received from the test takers and the results of the test survey, the questions were broken down into smaller units with less information. The second survey consisted of thirty-four self-efficacy questions related to the eleven behaviors. Many of the questions were redundant in this survey. This was done to find the best question for the specific behavior. This survey was then submitted to 50 AFIT students, but rejected for the same reason as the first survey. The central tendency was still significant. Comments received from the test takers resulted in a reduction of the demographic data questions from fourteen to eleven questions. Some of the demographic questions were reworded for clarity when there was confusion on what was wanted or intended.

A third survey was developed using a seven-point scale that asked the examinee to compare themselves, on a percentage basis, to their "ideal leader/manager." This direction was given in the instructions and repeated in the leading statement of each question.

Second, a new scale was developed to accompany the new instructions. The new scale extended from 75% to 110% of the ideal leader's or manager's capability to achieve success in five percent increments. The scale listed the ideal leader/manager at 100%. This scale, with its associated gradients in percentages, was chosen for several reasons. First, the scale was a seven-point scale which appears as a near

continuous scale in the mind of the person as they rate themselves. Second, the lowest score or rating of 75% was only five percent lower than needed for a passing grade in SOS on a pass/fail grading system. With this scale a student could grade their capabilities without associating their self-rating with a known failing grade. On the upper end of the scale the students may have an ideal leader/manager in mind which they now feel they could out perform, therefore, the top end was 110%. The final seven-point scale is shown in Figure 4.

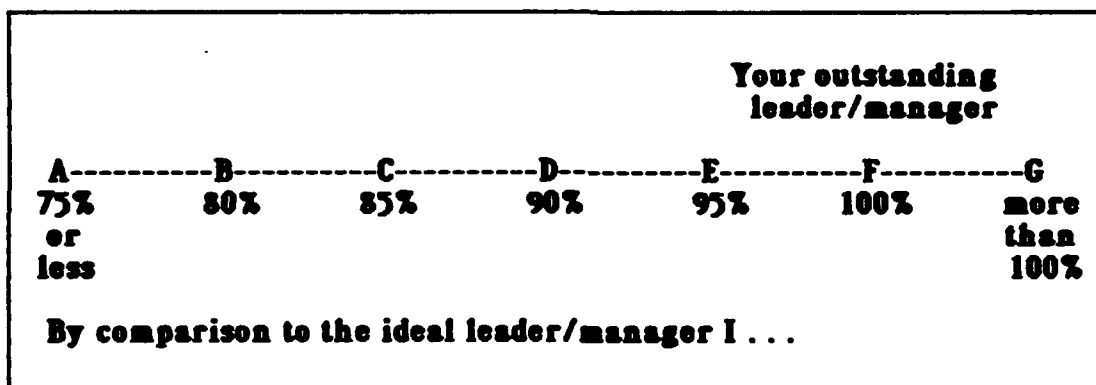


Figure 4. Final Seven-Point Scale

Third, the number of self-efficacy questions was narrowed to twenty-seven from the original thirty-four based on comments from the test takers of the second survey at AFIT.

Finally, the scoring sheet was changed to use an alpha scale rather than a numeric scale. For example, the numeric scale could become confusing as the student read 85% on the questionnaire and tried to mark #3 on the answer sheet. The alpha scale seemed to be less confusing to

read and mark. Consequentially, 85% equated to "C" on the new score sheet. This had no bearing on the scoring of the answer sheet since an optical scanner was used and can be programmed to read the answers as alpha or numeric values.

The third test survey was now administered to a new sample of fifty AFIT students. This survey yielded a reasonable spread in the responses of the examinees. The comments received back from the examinees were concerned with the wordiness of the instructions and the consistency of possession or ownership in the self-efficacy questions.

As a result of the final test survey, the instructions were simplified. Many of the questions were reworded to be consistent in possession or ownership of the work unit. Where applicable and possible, the questions were worded to reflect ownership of the work unit by the person taking the survey. The term "my work unit" was used in many of the questions.

General Assessment Questions. The last page of the survey listed (in an abbreviated form) the behaviors and definitions of Yukl's (1989) taxonomy. The students were asked to read the definitions and rate, in order, the top two items (with a "1" and a "2") in which they had their most improvement. They were then asked to "briefly" explain what events occurred to stimulate the change. The third question asked them to mark, with an "X," the item of behavior in which they had the least improvement and to briefly explain what could be done to improve the training in that area.

The reasoning for these questions are two fold. First, the general questions could provide very useful feedback to SOS for program improvement. Second, using the questions was an attempt to see if the students cognizant thought process agreed with the actual changes that occurred in self-efficacy.

Reverse Order Questionnaires. Trial testing also pointed out the possibility of test fatigue, even though the expected time to complete the survey was only 10 minutes. Reverse order questionnaires were used to minimize bias in answers should the examinees grow tired of answering the survey. A comparison of the quality of answers of those who took the original order and the reverse order survey could be made to determine if there was a fatigue problem. Fatigue testing could be done in two ways. The first method was to do a correlation analysis using the odd variables (questions) and the even variables (questions). An alternative to this approach was to use the first half of the variables and the second half of the variables in a correlation analysis. A second method compared the standard deviations of the first half of the questions and the second half of the questions. If there was a tendency to answer the questionnaire without reading the question, the responses would narrow in their deviation. A significantly narrower standard deviation might be an indication of test fatigue.

The final original order survey instruments used in this thesis are contained in the appendix. The reverse order surveys use the same demographic questions in the same order, but only the self-efficacy

questions and the general assessment questions were inverted in their order.

Field Procedures

In each case, the questionnaires were reproduced to allow each student to have their own survey booklet and answer sheet.

The SOS faculty divides each class into flights consisting of approximately thirteen people each. Each flight has a flight instructor who is a member of the faculty of SOS. Within each flight of students a Senior Ranking Officer (SRO). The SRO is responsible for coordination of administrative details for the flight for the duration of the school.

The surveys were packaged into envelopes containing thirteen surveys and answer sheets. The packages were marked with the flight number (i.e.; "A-12" for flight number A-12). The fifty packages were sent to the SOS Office of Evaluation (SOS/EDV). From there, they were distributed to the individual Flight Instructors who, in turn, distributed the tests to the students. Instructions were attached to each of the flight envelopes for collection. The Tests were completed, collected by SOS/EDV and returned by mail to AFIT.

Survey one, the posttest, was administered to class 91D. The survey was given to the class during the last week of the school just two days before their graduation. They had completed all but one major evaluation for the school. The survey was given on the same day as the end-of-course survey. The surveys were presented to the students with

the instructions to complete the survey and return it the SRO. The SRO would then return them to their Flight Instructor who, in turn, returned them to the squadron secretaries. They were picked up by the EDV office and returned by mail to AFIT.

Survey two, the pretest, was administered in the first week of class 91E. The surveys, were packaged in the same way as survey one. The surveys were given to the students by the flight instructors. They were ask to complete the survey and return them to the SRO. The steps for collection were the same as the first survey.

Development of the Data Analysis Plan

The data analysis plan was constructed in four parts. The first part, data processing, included the input of the optically scanned score sheets and any data reorganization or manipulation needed to create usable data sets for use in SAS programs. The second part of the analysis was used to checked the reliability and internal consistency of the survey instrument using correlation analysis. Third, the data was studied, looking for normality, correlation factors, and frequencies using correlation analysis, regression analysis, and T-tests. This step can be thought of as having been completed in parallel with step two. The analysis of these two steps had to be completed before assumptions could be made about the data used in the T-test analysis of the survey. The T-test requires the data to be normally distributed and randomly selected.

Before the fourth step of computing a T-test, assumptions of normality must be validated (Devore, 1987). The fourth step provided the answers to all three research questions. The analysis focused on a T-test, comparing the posttest of class 91D with the pretest of class 91E. The T-test is a method used to study the differences of the two samples and determines if the differences are significant. The program used for all statistical evaluation was SAS 6.06. This software package makes the analysis task very quick and efficient. The most difficult task was to develop the usable data sets after processing the score sheets.

Data Processing. Once the packages had been returned from SOS the score sheets were removed and, in the case of the posttest, the back sheets of the survey booklet removed. The score sheets were fed through an optical scanner which read the responses and placed the numerical values in a data file. The format for the data file used two digit integer numbers followed by a blank space. Each score sheet yielded one line for each observation, 114 space long. All missing values were recorded as blank spaces. Score sheets which produced all blank spaces or only demographic data were removed from the data set. Each flight was scanned individually and captured on a single file. A larger file was created with all of the data from all of the flights using the "APPEND" command of the main frame system. This process simply stacked all of the files in alphabetical order. This process was used to create two large files for each survey, the original order data and the reverse order data. These two sets would be needed to test for bias and fatigue.

The data was structured in the file with the first eleven inputs as the demographic data and the next twenty-seven inputs as the self-efficacy responses. In the case of the reverse order survey, the set of self-efficacy responses were read in from Q38 to Q12. To be compatible with the original order data set, the last twenty- seven variables would have to be inverted. Free formatted data files were used for all programing data files.

The process of inverting the variable values was completed in a SAS program. The reverse order data file was read in and a new inverted order file was output. The format of the inverted order file was the same as the original order file. The "APPEND" command was used once again to append the original order file and the inverted order file into a great file refereed to as "OR1DATA.DAT." This file contained all of the responses from the original and reverse order tests in a consistent format with the first eleven variables associated with the demographics and the last twenty- seven associated with the self-efficacy questions.

The same process was used for the second survey (the pretest) to format the data into the three files needed for evaluation: an original order file, a reverse order file, and a composite file. With each transformation of the data, the data sets were printed to provide a means of checking the input set with the actual data received on the score sheets. The inverted order data set was created with special care to ensure the data was consistent with the original order data set. This process ensured the

integrity of the data in the data sets used. The next section discusses the measures taken to ensure instrument reliability.

Instrument Reliability. The instrument reliability tests were done to test for built-in bias within the survey instrument. There were three main approaches used to test the instrument for reliability. The first two simply used correlation analysis and the third used Cronbach's alpha.

Odd/Even. This approach was simple in its execution. All that needed to be done was to define two new variables and, in a data transformation, assign values to the new variables. The two new variables chosen were called "ODD" and "EVEN." The transformation assigned all of the odd numbered variable to the new variable ODD and, likewise, the even numbered variables to the new variable EVEN. After the transformation, the variable ODD was the sum of $Q13+Q15+Q17+...Q37$, and the variable EVEN was the sum of $Q12+Q14+Q16+...Q38$.

First/Last. The alternative method used was the same process for two new variables which were called "FIRST" and "LAST." The new variable were assigned the first and last half of the responses respectfully. Now the variable FIRST was the sum of $Q12+Q13+Q14+...Q25$ and the variable LAST was the sum of $Q26+Q27+Q28+...Q38$.

Using the "PROC CORR" command in SAS, the analysis on all four variables was accomplished, correlating ODD with EVEN and then

correlating FIRST with LAST. The analysis needed to show high correlation with a small probability (with significance). This analysis only tested the instrument for internal consistency. The outputs produced by the analysis for the original order and reverse order tests must be compared to determine if there was bias or fatigue caused by the respondents.

To determine if there was bias or fatigue, the means and deviations of the FIRST and LAST variable need to be compared between the data sets original order and reverse order. There should be no significant difference between the two values for the two data sets.

Cronbach's Alpha. The reliability of the instrument was checked with the use of the raw variables, Q12 through Q38. Using the SAS "PROC CORR ALPHA" command, the twenty-seven variables were specified for use in a correlation analysis which determines Cronbach's alpha for the set. For this test, a significant value for alpha was 0.70 or greater to show instrument reliability.

Likewise, the skills were also checked for reliability using the same approach with Cronbach's alpha. The variables for the skills were created within the SAS program by adding the appropriate Q variables together. For example, SK1 was the sum of the variables Q23 and Q33. In the SAS program SK1 was created by setting $SK1 = Q23 + Q33$. The other SK's were created in the same manner, including the alternate SK values as well. Then the correlation analysis was run on the SK variables by looking for an alpha value of 0.7 or greater to assume skill reliability.

This completed the instrument testing. In a parallel process the data was also being tested. Both the instrument testing and the data testing needed to show positive results to support the requirements of a T-test. The following section describes the analysis that was performed on the data to ensure the proper methods and assumptions were used when studying the survey.

Data Testing. Data testing was completed to ensure the assumptions of normal distributions, no unique cross correlations, reasonable frequency distributions, no multicollinearity, and no singularity. The analysis was done in SAS with a few simple commands. The data testing starts with the Wilk's test for normality.

Normality - Wilk's Test. The variables for all of the questions and all of the skills were tested for normality. The value of the statistic for each variable should be 0.9 or greater for a confidence in the assumption of normality of the distribution in the data. This test was done in SAS with the "PROC UNIVARIATE" command. With the use of the options for frequency plots and normality plots, the information for each variable was contained on one sheet of print out.

Correlation Analysis. The correlation analysis was done to look for any unique correlations between the variables, demographics, and the skills. The correlation analysis was invoked by using the SAS command "PROC CORR." This analysis should show a correlation with significant probability between all of the self-efficacy questions and high correlation between the self-efficacy questions and the skills. Any

correlations between the self-efficacy questions or the skills and the demographics could lead to new understandings of SOS or the sample of captains surveyed. Correlations such as these may open new dimensions of study in the SOS training program or leadership/management in general.

Within the correlation analysis the covariance matrix was requested from the SAS program using an option to the PROC CORR command. The covariance matrix should not yield any covariance of great magnitude. SAS uses a default of 1×10^8 as the default for singularity. Any covariance of great magnitude would require further study of the variables that caused the problem.

Frequency Distributions and Histograms. Frequency plots in the form of histograms were produced while testing with the PROC UNIVARIATE command. At this point they were reviewed again for any abnormal distributions. Abnormal distributions would include multiple peaks separated by one or more valleys, single value response plots, or plots with an inverted bell shape. These plots were obtained with the "PROC UNIVARIATE" command using the frequency plot option.

Regression Analysis. Regression analysis was performed on the SK variables only. The regression analysis was done at a 0.05 significance level with both a 0.05 selected level for entry and a 0.05 selected level for staying in the regression equation. The regression analysis was completed to determine if there are other Q's which should be considered in the composition of the SK variables. The analysis should

yield linear model using the Q's assigned to the SK variables as the only variables needed for a linear regression model of 0.05 significance. The SAS command, "PROC REG" with option stepwise was used for entry selection of the variables into the model.

Once again this analysis of the data must be considered in parallel with the analysis of the instrument. Any anomalies would have to be accounted for before proceeding to the next step of analyzing the survey to answer the research questions. All data must be assumed to be randomly selected and normal in its distribution before the T-test can be used for evaluation of the surveys.

Analysis of the Survey. The T-test was used to compare the scores of the pretest and posttest. The T-test is a test that compares the distributions of each sample and provides information on the probability of the second sample being different from the first. To use the T-test the data must be normally distributed for all variables and randomly selected. Because N (the number of students surveyed) was large, the central limit theorem can be invoked (Devore, 1987). In this thesis, the pretest of class 91E was compared to the posttest of class 91D, which gives a T value for the mean of the pretest with respect to the mean of the posttest. What was important is to determine if the second sample has the probability of being from a different population. The population would be different if self-efficacy has changed, up or down. Hopefully the analysis shows a difference in the two samples and self-efficacy has been improved. The T values should use a confidence level of 95% (significance level of 0.05)

which dictates a value of T to be 1.96 or greater. At a 99% (significance level of 0.01) confidence level, the T value should be 2.576 or greater (Neter et al., 1990).

This procedure was accomplished in SAS using the "PROC TTEST" command. The output reports the values of the means of the variables by sample (pretest or posttest), the standard deviation, standard error, T, degrees of freedom, and probability of $t > |T|$ (the significance level). In this test, the significance level should be 0.05 or less to provide a reasonable assumption that the second sample actually was different from the first.

Controls and Limitations

No research is without its limitations, and this research was no exception. The controls on this experiment are limited to the care of preparation and administration. For example, each flight received their own package with 13 surveys and answer sheets. All the flight had to do was complete the surveys and return them to the flight instructors. The instructions were simplified as much as possible for each person involved.

This type of survey is common and the tendency not to read the instructions was considered as the survey was devised. The survey was constructed to be as generic in structure as possible. Then, when someone did not read the instructions, the survey could still be completed satisfactorily.

The surveys were tested with subjects similar to the final sample prior to sending the survey to SOS. Of the students at AFIT, approximately seventy-five percent had attended SOS and were familiar with the environment of SOS. They were within the same age group and point in their careers. The students at AFIT were asked to critique the survey and time themselves when they completed the survey.

By testing the surveys at AFIT, much of the work needed for the analysis was devised in advance of the SOS surveys. Then when the data for the SOS surveys arrived, only the procedures needed to be verified.

There are several weakness associated with this thesis as well. First, the use of a separate-sample test design opened the question of generalizability of a posttest-pretest comparison to the actual change in individuals over time. However, the ongoing research in this area should help to answer this concern with a survey at the end of class 91E.

Second, the posttest of class 91D was given to them on the same day as the end of course survey. By doing both surveys in the same day, even during the same time periods, there could have been some bias induced into one or both surveys.

Third, the pretest of class 91E was filled out by the students over a two to three day period. This delay in the completion was induced by a simple administrative error in the collection instructions. This delay could have allowed some flights to experience events others had not at the time they filled out the surveys.

Fourth, the demographics of each class (sample) were slightly different. The second class, 91E, was generally speaking slightly older, with slightly more prior enlisted experience, and more total active military service time. These experience factors may mean that the second class had a higher self-efficacy rating upon entrance to SOS.

Summary

This chapter has discussed the reasoning and methods used in the development of the research plan. Developing the survey was difficult but fruitful in the final results. The rationale of the analysis plan has been explained in order to make the next chapter more easily understood. This plan follows a basic path of analyzing the data to ensure all assumptions made are reasonable for the given data prior to analyzing the survey's outcomes. If the surveys were analyzed prior to checking the data the analysis could be in error due to false assumptions. Chapter IV provides the results of the analysis developed in this chapter with explanation of the outcomes.

IV. Results

Introduction

Following the methodology developed in the preceding chapter this chapter presents the analysis results. The first topic covered is a short summary of the demographics of the classes. Second, instrument reliability results are presented followed by the results of the data analysis. The fourth section covers the results of the analysis of the two surveys, presenting the results of their differences with the comparative T-test. Before the results of the analysis can be understood in the proper perspective the reader must be aware of the differences in the demographic make-up of the two groups.

Demographics

The differences in the demographics could make a difference in how the comparative data analysis was viewed. However, there are only minor differences in the two sample groups. The two groups are for the most part very uniform and practically equal in their make-up. Class 91D had 530 students who answered the survey and class 91E had 547 students answer the survey. Since the two classes responded in approximately equal numbers there were no problems created by unequal samples.

The ages of the two groups were separated by a few weeks. The mean of the ages approximates 30 years and 7.75 months for class 91D and 30 years and 2.5 months for class 91E. This leaves only a 5.5 month average age difference in the respondents of the two samples.

The next variable was the number of people supervised in their regular Air Force job. For these two samples, class 91D and 91E there was no significant differences. Each class supervises an average of 8.5 people in their regular Air Force position. Both age and the number of people supervised could have led to differences in experience levels, but neither showed significant differences.

Total Active Federal Military Service time (TAFMS) is the amount of military experience the individual has. As a class 91D had an average of 6 years and 8 months of TAFMS time, while class 91E had 7 years and 4 months of TAFMS time.

Some officers entered the service by first enlisting. At some point in their careers they left the enlisted ranks and received an officer's commission. Their prior enlisted time may also reflect a difference in the changes of perceived self-efficacy. Class 91D had 108 people (20.4%) with an average of 3.27 years of prior enlisted time and class 91E had 145 people (26.5%) with an average of 3.45 years of enlisted experience. This equates to a class average of 8 months per person and 11 months per person for classes 91D and 91E respectively.

The split between male and females was not significantly different between the two classes. Class 91D had 93 females (17.6%) and class 91E had 73 females (13.4%). Again the differences are not significant.

Among the numbers of married students in each class presented no significant differences. Class 91D had 66.2% married and class 91E had 68.6% married.

The experience of raising children was thought to possibly have bearing on the changes in perceived self efficacy, but there was no significant differences between the two classes. Class 91D had 45.5% of the students who had children and class 91E had 49% with children.

Leadership and management training could also effect the changes of leadership or management self-efficacy. However, between the two classes each were equal in the number of students, who had had additional training. Of the students in class 91D 31.9% have additional training and class 91E had 31.0% of its students who have had additional training.

An Air Force officer's commission can come from one of three main sources: a service academy, Officer Training School (OTS), or a Reserve Officer Training Corps (ROTC) program. The fourth alternative can include such sources as a battlefield commission or legislative action of congress. Once again, there was no significant difference in the two classes. Class 91E had 13.6% from the academies, 37.1% from OTS, 39.5% for ROTC and 9.9% other type commissions. Class 91E had 15.0% from the

academies, 32.0% from OTS, 42.4% from ROTC, and 10.5% from other sources of commission.

In summary, there are few differences between the two samples. The significant differences in age, TAFMS, and prior enlisted time are correlated with each other. By being older the each student has the potential for having been in the service longer, likewise by having prior enlisted time the TAFMS time will also be greater. The Pearson correlation coefficient between age and TAFMS was .635, between age and prior enlisted time .638, and between TAFMS and prior enlisted time .817; all with a significance level of 0.0001. In all cases the experience level of class 91E was higher than class 91D. What this may mean is a higher level of self-efficacy in class 91E upon entry in SOS, thereby, reducing the level of measured differences in perceived self-efficacy.

Instrument Reliability

Odd/Even. Two tests were conducted to check instrument reliability. The first test divided the variables (questions) by picking every other variable and summing them up into the group variable called "EVEN." Likewise, the odd variables were summed together forming variable "ODD." The two new variables were run in a correlation analysis with each other. The results of the correlation show a high Pearson correlation coefficient between the variables of 0.93 for class 91D and 0.91 for class 91E. Both of the coefficients had a significance level of 0.0001.

First/Last. The second test rearranged the variables into the first half and the second half of the variable questions. These new variables were called "FIRST" and "LAST." These variables were used with the data sets of original order and reverse order tests. This concept was testing for fatigue caused by the instrument or the environment.

For the first survey the correlation for the original ordered survey for FIRST and LAST was 0.85 and for the reverse order survey it was 0.90 both at a significance level of 0.0001. For the second survey the original order survey had a correlation of 0.84 and the reverse order correlation was 0.88, again both with a significance level of 0.0001. This indicates the results obtained from the administration of the instrument were not biased by fatigue.

Cronbach's Alpha. SAS was used to calculate the values for Cronbach's alpha for each individual skill. Each skill was tested in each group. The Cronbach's alpha for each group is reported in Table 3 with the associated questions which comprise each skill. An interesting note was the fact that the alphas for class 91E were substantially lower in all cases than class 91D. Table 4 includes all of the possible combinations of questions in the skills as per the expert panel. The skills were evaluated using the Cronbach's alphas and the weaker skills were removed.

Table 4. Cronbach's Alpha for Skills

SKILL NUMBER	BEHAVIOR	ALPHA FOR GROUP I / II	ASSOCIATED QUESTIONS
SK1	NETWORKING	0.585/0.474	23 & 33
SK1B		0.694/0.609	SK1 + 16
SK2	SUPPORTING	0.764/0.630	14, 18, 28, & 36
SK2B		0.733/0.598	SK2 - 18
SK3	MANAGING CONFLICT AND TEAM BUILDING	0.803/0.763	22, 34, & 38
SK4	MOTIVATING	0.736/0.633	13, 25, & 37
SK5	RECOGNIZING AND REWARDING	0.687/0.686	15 & 26
SK6	PLANNING AND ORGANIZING	0.657/0.658	20 & 31
SK6B		0.742/0.692	SK6 + 16
SK6C		0.757/0.700	SK6 + 18
SK6D		0.798/0.744	SK6 + 16 + 18
SK7	PROBLEM SOLVING	0.782/0.706	24 & 29
SK8	CONSULTING AND DELEGATING	0.608/0.559	12 & 32
SK9	MONITORING OPERATIONS AND ENVIRONMENT	0.698/0.610	19 & 30
SK9B		0.773/0.702	SK9 + 18
SK10	INFORMING	0.740/0.681	16, 21, & 35
SK10B		0.705/0.629	SK10 - 16
SK11	CLARIFYING ROLES AND OBJECTIVES	0.712/0.664	17 & 27
SK11B		0.813/0.745	SK11 + 18

The grouping of questions into the skills can now be arranged to give the best reliability for each skill. Using a table of Cronbach's alpha's provided by Carmines and Zeller (1979:46), and the average intercorrelation between variables the skills can be narrowed to only the

significant ones. For example, SK1B (Networking), has a significantly higher alpha with the addition of question 16 than SK1, therefore, in accordance with Carmines and Zeller (1979), SK1 was removed from further consideration. Likewise, SK2B, SK6, SK6B, SK6D, SK9, SK10B, and SK11 were all removed from the matrix. The resulting skills are shown in Table 5.

Table 5. Modified Table of Skills

SKILL NUMBER	BEHAVIOR	ALPHA FOR GROUP I / II	ASSOCIATED QUESTIONS
SK1B	NETWORKING	0.694/0.609	16, 23, & 33
SK2	SUPPORTING	0.764/0.630	14, 18, 28, & 36
SK3	MANAGING CONFLICT AND TEAM BUILDING	0.803/0.763	22, 34, & 38
SK4	MOTIVATING	0.736/0.633	13, 25, & 37
SK5	RECOGNIZING AND REWARDING	0.687/0.686	15 & 26
SK6C	PLANNING AND ORGANIZING	0.757/0.700	18, 20, & 31
SK7	PROBLEM SOLVING	0.782/0.706	24 & 29
SK8	CONSULTING AND DELEGATING	0.608/0.559	12 & 32
SK9B	MONITORING OPERATIONS AND ENVIRONMENT	0.773/0.702	18, 19, & 30
SK10	INFORMING	0.740/0.681	16, 21, & 35
SK11	CLARIFYING ROLES AND OBJECTIVES	0.712/0.664	17 & 27

Questions 16 and 18 each appeared in two skill variables. Question 16 was a part of SK10, its original skill and SK1B its alternative variable as placed by the panel of experts. Question 18 was listed in SK2 as originally planned and also in SK9B as placed there by the panel. The list of skills and variables shown in Table 5 were used for calculations and analyses. The reduced list with the questions, grouped as they are with their respective skills, are statistically the best arrangement of questions in line with Yukl's (1989) skills.

This completes an important step in the analysis of the skills as they relate to the research questions. However, the analysis of the survey could not be completed until the analysis was completed on the data.

Data Testing

Normality - Wilk's Test. Testing of the raw data showed all Q variables to be normal in their distribution. The extreme values for each sample (Group) are given in the table below.

With all variables distributed with a Wilks' coefficient of 0.9 or greater the assumption of normality was made. The Wilk's coefficients are shown on the following page in Table 6.

Table 6. Lowest and Highest Wilk's Coefficients by Group

Lowest Wilks Coefficient	Question	Highest Wilks Coefficient	Question
Group I 0.9080	14	Group I 0.9277	16
Group II 0.9072	14	Group II 0.9259	25

Correlation Analysis. Using the SAS command "PROC CORR" with all variables the correlation analysis revealed no unique correlations. All correlations between the variable questions ranged from 0.29838 for a correlation between questions 12 and 36 to a 0.64806 correlation between questions 17 and 18. All correlations between all of the questions had a significance level of 0.0001.

When the correlations between the skills and the questions were completed there were no abnormalities discovered. The skills had correlation coefficients which ranged from 0.52130 between SK7 and SK5, to 0.86800 between SK6C and SK9B. Like the questions the skills also had all significance levels at 0.0001.

Looking at the correlation analysis between the skills and the demographics there was 34 correlations with significance levels above 0.05 out of the possible 121 combinations. The greatest number of correlations occurred with the demographic variable for number of people supervised on the students regular job. All 11 skills correlated with a significance of 0.05 or better. However, the Pearson correlation

coefficients were not strong in any case. The largest coefficient was 0.21831 for correlation between the number of people supervised and SK11 (Clarifying Roles and Objectives). While the lowest, 0.08851, occurred between the variable for the PAFSC and SK3 (Motivating).

The covariance matrix was requested for all variables and there was no coefficients found to be greater than 2.1425 in group I (question 13) and 2.3580 in group II (question 13). Both groups yielded much smaller coefficients than the 1×10^5 value that would indicate singularity. All variables are assumed nonsingular.

Frequency Distributions and Histograms. This particular analysis was a simple exercise of checking plots and tables. As expected with the Wilks coefficients in the 0.9 range no anomalies were found. The only skewed, or non-normally distributed data occurs in the demographics. The demographic variables are not needed for the analysis of perceived self-efficacy and therefore, they are ignored.

Regression Analysis. The regression analysis was completed on the skill variables. All skill variables yielded only the questions which they are composed of as factors for a linear equation. As an additional check the significance value was reduced to 95% by setting the selection for entry by a new variable in the stepwise method to 0.5. At this reduced level the only variables entered into the equations were the variable questions assigned to the skills. For example, the regression analysis for SK4 yields the same linear equation that defines SK4.

All indications were the assumptions needed to justify a T-test were satisfied. The data could be assumed to be normally distributed and randomly selected. The next section discusses the analysis of the survey for changes in perceived self-efficacy and presents the results of the research.

Analysis of the Survey

To analyze the differences in the scores of class 91D and 91E a T-test was done to compare the means and distributions of the skills. The T-test requires an assumption that the data was normally distributed and randomly selected for all variables. The assumptions were met as previously discussed.

The number of observations (students) are large enough that the central limit theorem can be invoked (Devore, 1987). To assume a 95% confidence level (significance level of 0.05) the T value must be 1.96 or greater. For a 99% confidence level the associated T value must be 2.576 or greater (Neter et al., 1990). The SAS command of "PROC TTEST" was used for all T-test analysis. Table 7 shows the results of the T-test on the questions (Qn's). The T-test compared the class of 91E (group I) to the class of 91D (group II).

Table 7. T-Test Results of Analysis on the Questions

Variable	Q12	Q13	Q14	Q15	Q16	Q17	Q18
Mean By Group	I 3.633 II 3.1871	I 3.8930 II 3.4673	I 4.3603 II 4.4889	I 3.9828 II 3.8407	I 3.8569 II 3.5433	I 3.7338 II 3.3879	I 3.8099 II 3.3083
T Value	4.8188	4.5926	-1.5724	1.6584	3.6287	3.8860	5.5791
Prob > T	0.0000	0.0000	0.1162	0.0975	0.0003	0.0001	0.0000

Variable	Q19	Q20	Q21	Q22	Q23	Q24	Q25
Mean by Group	I 4.0817 II 3.8991	I 3.7533 II 3.4614	I 4.2049 II 4.2169	I 4.0171 II 4.0570	I 3.6565 II 3.4044	I 4.0759 II 3.8527	I 4.1328 II 3.9374
T Value	2.2542	3.3955	-0.1405	-0.5063	2.7441	2.6139	2.3353
Prob > T	0.0244	0.0007	0.8883	0.6128	0.0062	0.0091	0.0197

Variable	Q26	Q27	Q28	Q29	Q30	Q31	Q32
Mean by Group	I 4.4508 II 4.5543	I 3.9433 II 3.5985	I 3.9261 II 3.7901	I 4.2879 II 4.2228	I 3.7992 II 3.5488	I 3.7652 II 3.4217	I 4.0265 II 3.8380
T Value	-1.2741	3.9351	1.5265	0.7707	2.9509	3.8329	2.2790
Prob > T	0.2029	0.0001	0.1272	0.4411	0.0032	0.0001	0.0229

Variable	Q33	Q34	Q35	Q36	Q37	Q38
Mean by Group	I 4.2106 II 4.3002	I 3.9545 II 3.7970	I 4.1676 II 4.0651	I 4.2405 II 4.3060	I 4.2548 II 4.0393	I 3.9237 II 3.8891
T Value	-1.0598	1.9119	1.2313	-0.7658	2.6499	0.4109
Prob > T	0.2895	0.0562	0.2185	0.4440	0.0082	0.6812

The skills were then assembled using the derived questions from the survey. Each skill was a linear combination of the respective questions. The skills are listed in the following table with the respective questions comprising each skill. Table 8, on the next page, shows the means for each group listed for each skill. For the T-test the smaller the probability of $T > |T|$ the greater the significant difference is. Likewise, the higher the T value the greater the difference.

The skills were then combined into the four broad categories which Yukl (1989) describes as: giving - seeking information, making decisions, influencing people, and building relationships. The broad category of giving - seeking information was a linear combination of three skills; monitoring operations and environment (SK9B), informing (SK10), and clarifying (SK11). Making decisions was a linear combination of three skills; planning and organizing (SK6C), problem solving (SK7), and consulting and delegating (SK8). Influencing people was a linear combination of only two skills; motivating (SK4) and recognizing and rewarding (SK5). The last broad category, building relationships was comprised of three skills; networking (SK1B), supporting (SK2), and managing conflict and team building (SK3). A summary of the analysis on the four broad categories is listed in Table 9 on page 76.

Table 8. T-Test Results of Analysis on Yukl's (1989) Skills

Variable	SK1B	SK2	SK3	SK4	SK5	SK6C
Skill Name	Networking	Supporting	Managing Conflict and Team Building	Motivating	Recognizing and Rewarding	Planning and Organizing
Questions	16 23 33	14 18 28 36	22 34 38	13 25 37	15 26	18 20 31
Mean By Group	I 11.7179 II 11.2481	I 16.2865 II 15.9019	I 11.8482 II 11.7342	I 12.2251 II 11.4752	I 8.4376 II 8.4022	I 11.3078 II 10.1878
T Value	2.3160	1.5160	0.5432	3.6659	0.2417	5.2334
Prob > T	0.0208	0.1298	0.5871	0.0003	0.8091	0.0000

Variable	SK7	SK8	SK9B	SK10	SK11
Skill Name	Problem Solving	Consulting and Delegating	Monitoring Operations and Environ-ment	Informing	Clarifying Roles and Objectives
Questions	24 29	12 32	18 19 30	16 21 35	17 27
Mean By Group	I 8.3695 II 8.0755	I 7.6596 II 7.0255	I 11.6851 II 10.7532	I 12.2235 II 11.8299	I 7.6705 II 6.9778
T Value	1.9378	4.2019	4.4859	1.9306	4.4803
Prob > T	0.0529	0.0000	0.0000	0.0538	0.0000

**Table 9. T-Test Results of Analysis
on the Four Broad Categories**

Variable	GIVESEEK	MAKDECIS	INFLUENC	RELATION
Broad Category	Giving and Seeking Information	Making Decisions	Influencing People	Building Relationships
Skills	SK9B SK10 SK11	SK6C SK7 SK8	SK4 SK5	SK1B SK2 SK3
Questions	16 17 18 19 21 27 30 35	12 18 20 24 29 31 32	13 15 25 26 37	14 16 18 22 23 28 33 34 36 38
Mean by Group	I 31.5453 II 29.5589	I 27.2156 II 25.2686	I 20.6434 II 19.8779	I 39.7252 II 38.8723
T Value	3.9236	4.3131	2.3785	1.4205
Prob > T 	0.0001	0.0000	0.0176	0.1558

The only skill category which did not show any significant improvement was that of building relationships (RELATION). However, the confidence level for this variable was 91.49%, rather than the 95% required by this thesis. The skill of building relationships is not be discarded, but retained for study.

Changes in the Leader Role and the Management Roles

The last analysis to be completed was the breakout of skills in accordance with Mintzberg's (1980) taxonomy. Mintzberg's leader role consists of the following skills: supporting (SK2), managing conflict and team building (SK3), motivating (SK4), recognizing and rewarding (SK5),

consulting and delegating (SK8), and clarifying (SK11). Mintzberg's managers roles are associated with Yukl's skills of: networking (SK1B), planning and organizing (SK6C), problem solving (SK7), monitoring operations and environment (SK9B), and informing (SK10). A T-test conducted on the manager and leader roles produced the results shown in Table 10.

**Table 10. T-Test Results of Analysis
on Mintzberg's Leader and Manager Roles**

Variable	MANAGER	LEADER	LEADER (w/o Duplicate Q's)
Skills	SK2 SK3 SK4 SK5 SK8 SK11	SK1B SK6C SK7 SK9B SK10	SK1B SK6C SK7 SK9B SK10
Questions	12 13 14 15 17 18 22 25 26 27 28 32 34 36 37 38	16 16 18 18 19 20 21 23 24 29 30 31 33 35	16 18 19 20 21 23 24 29 30 31 33 35
Mean by I	55.8928	55.1950	47.5444
Group II	54.3816	52.0729	45.2411
T Value	1.7568	3.6994	3.2071
Prob > T 	0.0793	0.0002	0.0014

As illustrated in Table 10, the manager roles did not improve with the significance of the leader role. Even after removing the duplicate questions to prevent double adding of the values, the leader role still showed significant increases in perceived self-efficacy. The results of this test suggested that SOS does not provide significant training to increase

the perceived self-efficacy of its students in the management roles as described by Mintzberg (1980). However, there was substantial changes to the students perceived self-efficacy for the skills associated with Mintzberg's (1980) leader role.

V. Conclusions, Recommendations and Summary

Introduction

This thesis set out to determine three things. Does the self-efficacy of the students of SOS change as a result of attending SOS? What aspects of the leadership self-efficacy change the most? Can a reasonably instrument be developed to measure the changes in self-efficacy? All three questions can be answered positively. Changes do occur in the students. When measured against Mintzberg's (1980) ten roles of a manager the leader role shows the most significant change. Finally, a reasonable instrument has been developed to measure the changes in leadership perceived self-efficacy.

This research started by identifying a taxonomy of leadership and management skills to use as a basis for measurement of the perceived leadership self-efficacy of the SOS students. An instrument was developed to measure the changes in perceived self-efficacy, and worked well as a tool in that measure.

The instrument must also be accepted as a reasonable means of self-assessment of self-efficacy. Statistically the instrument should be extremely reliable with an overall Cronbach's alpha of 0.9576 for the posttest of class 91D and 0.9388 for the pretest of class 91E. Each of the questions were derived directly from the definitions of the eleven skills. The 11 skills produced Cronbach alphas of substantial value in accordance

with Carmines and Zeller (1970). The skills and their respective alphas are listed in Table 11.

Table 11. Cronbach Alphas for Yuki's Skills

Skill Number and Name	Cronbach's Alpha by Group	Skill Number and Name	Cronbach's Alpha by Group
SK1B - Networking	I 0.694 II 0.609	SK7 - Problem Solving	I 0.782 II 0.706
SK2 - Supporting	I 0.764 II 0.630	SK8 - Consulting and Delegating	I 0.608 II 0.559
SK3 - Managing Conflict and Team Building	I 0.803 II 0.763	SK9B - Monitoring Operations and Environment	I 0.773 II 0.702
SK4 - Motivating	I 0.736 II 0.633	SK10 - Informing	I 0.740 II 0.681
SK5 - Recognizing and Rewarding	I 0.687 II 0.686	SK11 - Clarifying Roles and Objectives	I 0.712 II 0.664
SK6C - Planning and Organizing	I 0.757 II 0.700		

The results of the testing and analysis concluded that self-efficacy did change after the students had attended SOS. The changes were recorded with a certain consistency among the skills. The significant changes in leadership versus management were not expected. The method devised in this thesis for measuring the effects of training does have promising implications for future uses in many fields.

Changes in Self-Efficacy

The results show that there were substantial changes in perceived self-efficacy. Starting with Mintzberg's ten roles of a manager, the results found a significant change ($P > |T| = 0.0014$) in the self-efficacy of the students in the leader role, with a lesser change ($P > |T| = 0.0793$) in the management roles. This raises the first question that needs to be answered by the Air Force. Are the roles of a [leader] manager as defined by Mintzberg (1980) and Yukl (1989) a suitable discriminators for changing the training at SOS? This difference in the two relative changes also begs the question of how much change was observed in the individual skills of Yukl's taxonomy? First, a review of the changes in the four broad categories of Yukl's (1989) integrating taxonomy.

Yukl's (1989) taxonomy starts with the four broad areas of leadership: giving and seeking information, making decisions, influencing people, and building relationships.

As an observation the four general categories can be reduced to two basic categories of behaviors - task oriented skills and interpersonal oriented skills. The task oriented skills are giving and seeking information and making decisions. These skills and behaviors link the leader to the organization and its goals. The interpersonal oriented skills are building relationships and influencing people. These are some of the primary skills left undefined by Mintzberg (1980) in his ten roles. The interpersonal skills are those most needed for good relations between the leader and the

subordinates. The left side of Figure 5 shows how the four broad categories can be split to differentiate the two broader skill levels.

The results of this study showed the top half as the top two task oriented categories of measured change. The bottom two task oriented categories were also the least significantly changed in the SOS students.

The skill which resulted in the most significant change in self-efficacy was making decisions; second, was giving and seeking information, the third was influencing people, and the least significantly improved was building relationships.

Task	Exchanging Information	Making Decisions
	Informing Clarifying Monitoring (Second greatest change in S-E)	Problem Solving Planning & Organizing Consulting & Delegating (Greatest change in S-E)
Interpersonal	Building Relationships	Influencing People
	*Managing Conflict & Team Building Networking *Supporting (No significant change in S-E)	Motivating *Recognizing & Rewarding (Third greatest change in S-E)

* - Indicate skills that showed no significant change in perceived self-efficacy.

Figure 5. Interpersonal and Task Oriented Skills

This may indicate several occurrences: first the Air Force may be placing more emphasis on the task-oriented skills. In spite of the value placed on interpersonal skills, our military training environment may have less interpersonal skills training than task-oriented skills. There may be an unconscious de-emphasizing of the interpersonal skills training. Another possibility was suggested by the rating of self-efficacy before SOS. The highest incoming scores as well as the highest average score over the two samples are ordered differently.

Both groups displayed the same order of magnitude in self efficacy for leadership roles. In order of greatest to least magnitude of perceived self efficacy the order was first, building relationships; second, giving and seeking information; third, making decisions; and forth influencing people. The reason for the lesser improvement in building relationships may be due the fact that the skills are already acquired to such a degree that the training was not able to improve upon the capabilities. This argument cannot be used for the remaining three categories where the second greatest average was also the second greatest improved. Likewise, the category with the third greatest average was the most improved, and the category with the least average resulted in the third greatest improvement. The results of the measured changes in the four broad categories direct attention toward the skills which comprise the four categories for more information.

Of the eleven skills, three returned confidence levels under 95%. Those skills were (in order from least significant to most significant): recognizing and rewarding, managing conflict and team building, and supporting. These three skills make up significant portions of the two lowest of the broad categories. Of the ten questions which make up the category of building relationships seven are from the three least improved skills. That's 7/10 of the category, while the third skill used to describe the category, networking, rated sixth out of the eleven. For the category of influencing people, two of the five questions came from recognizing and rewarding while the remaining three questions came from the motivating skill, ranked fifth out the eleven in the list.

Thoughts For Future Research

The three test series needs to be completed, in order that the research done here can be validated. Additional testing with the same or similar test should be conducted to increase the data base and ultimately the validity of the concepts. Comparisons of the data gathered in this testing could be made with the findings of Dr Yukl. Yukl's (1989) taxonomy was developed, in part, from statistical analysis. The military may have its own unique factors of leadership and management which should be enhanced through its training programs.

Final Summary

Overall, SOS is doing a good job in training it students leadership in accordance with Yukl's (1989) taxonomy. The research has shown the

technique of measuring perceived self-efficacy works well for measuring the effects of leadership training at SOS. SOS does make significant changes in the perceived leadership self-efficacy of its students. All indications are that the students are more willing to engage in the behaviors of Yukl's (1989) taxonomy and secure positive results.

However, SOS did not significantly improve self-efficacy in the three areas of recognizing and rewarding, managing conflict and team building, and supporting. If these observations hold out, SOS may want to consider first, determining the underlying reason(s) and then, make changes to the training program.

Using self-efficacy assessments allowed the program to be evaluated in very specific areas. If changes are made to the program another survey could then be used to evaluate the changes.

Appendix: Original Order Survey Instrument

This appendix contains a copy of the original order survey and answer sheet which was used in the posttest of class 91D. The same survey was used again in the pretest of class 91E. The difference between the two tests is the instructions. Class 91D was not asked to identify themselves in any way. Class 91E was asked to place their flight number and the last four digits of their social security number in the upper right corner of the answer sheet. Class 91E was asked to identify their answer sheets so they could use the same answer sheets later in the posttest of their class. The results of the posttest on class 91E are not reported in this thesis.



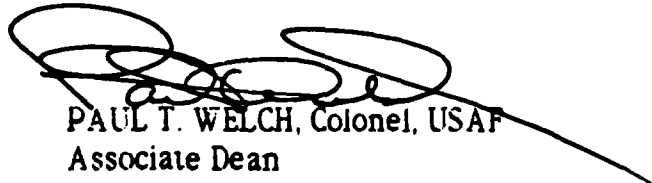
**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OH 45433-6583**

20 MAY 1991

**From: AFIT/LS
Subject: SOS Questionnaire
To: SOS Students**

This questionnaire could make a significant impact on the future of Air Force training. The inputs you make will help the Air Force evaluate itself on the training it offers its officers and future leaders. Please take the time to carefully read and answer this questionnaire as accurately as possible.

Thanks for taking the time to give your inputs.


**PAUL T. WELCH, Colonel, USAF
Associate Dean
School of Systems and Logistics**

STRENGTH THROUGH KNOWLEDGE

CHALLENGES 91

The purpose of this questionnaire is to capture the important, but less obvious, characteristics of your SOS experience. The answers you provide may be used to improve the SOS programs of the future. Your participation in this survey is strictly voluntary.

Because the honesty of your input is very important, the anonymity of each student will be preserved. In order to allow you to freely answer each of the questions there will be no attempt to correlate any individual with any particular response or set of responses. This questionnaire is not part of the personal evaluation for SOS and will not be scored here at the school.

Final results will be available to any one when published in September, 1991.

INSTRUCTIONS

Use pencil only for all marks made on the answer sheet.

Do not put your name or any other marks that would identify you on the answer sheet or in the survey booklet. You may write in the booklet, but be sure to transfer all answers to the answer sheet.

Once you have completed, return the questionnaire and answer sheet to your flight's Senior Ranking Officer.

1. Age on your last birthday?

A. less than 22	D. 27 to 28	G. 33 to 34
B. 23 to 24	E. 29 to 30	H. 35 to 36
C. 25 to 26	F. 31 to 32	I. more than 36

2. What is your current primary Air Force Speciality Code (AFSC)?

A. 10, 11, or 12XX	H. 26, 27, or 28XX	O. 73, 74, 75, or 76XX
B. 13, or 14XX	I. 31, or 40XX	P. 79XX
C. 15, or 22XX	J. 49XX	Q. 80XX
D. 18XX	K. 55XX	R. 81, or 82XX
E. 19XX	L. 64XX	S. 9XXX
F. 20XX	M. 65, OR 66XX	T. OTHER
G. 25XX	N. 67XX	

3. If you have a current secondary Air Force Speciality Code, what is it?

A. No Secondary AFSC	H. 25XX	O. 67XX
B. 10, 11, or 12XX	I. 26, 27, or 28XX	P. 73, 74, 75, or 76XX
C. 13, or 14XX	J. 31, or 40XX	Q. 79XX
D. 15, or 22XX	K. 49XX	R. 80XX
E. 18XX	L. 55XX	S. 81, or 82XX
F. 19XX	M. 64XX	T. 9XXX
G. 20XX	N. 65, or 66XX	U. OTHER

4. If you supervise others in your regular job, how many people do you supervise?
You should include those you do not write or sign appraisals/evaluations on.

A. I do not supervise others	E. 15 to 20	I. 51 to 100
B. 1 to 5	F. 21 to 25	J. more than 100
C. 6 to 10	G. 26 to 30	
D. 11 to 15	H. 30 to 50	

5. How many total years have you been in the service that count toward retirement?

A. less than 2 years
B. more than 2 but less than 4 complete years
C. more than 4 but less than 6 complete years
D. more than 6 but less than 8 complete years
E. more than 8 but less than 10 complete years
F. more than 10 but less than 12 complete years
G. more than 12 but less than 14 complete years
H. more than 14 but less than 16 complete years
I. more than 16 but less than 18 complete years
J. more than 18 complete years

6. If you have had prior enlisted experience, how many years where you enlisted?

A. No prior enlisted experience
B. less than 2 years
C. more than 2 but less than 4 complete years
D. more than 4 but less than 6 complete years
E. more than 6 but less than 8 complete years
F. more than 8 but less than 10 complete years
G. more than 10 but less than 12 complete years
H. more than 12 but less than 14 complete years
I. more than 14 but less than 16 complete years
J. more than 16 complete years

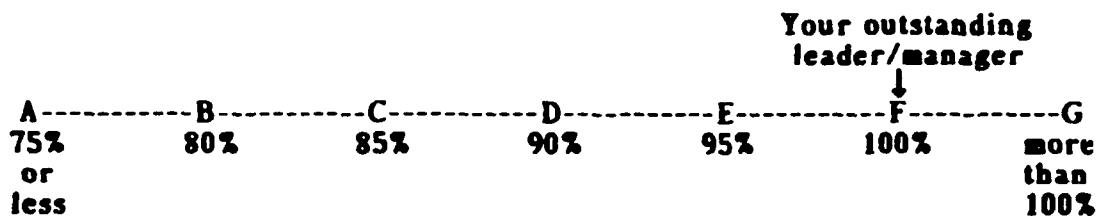
7. Your sex is:
 - A. male
 - B. female
 8. Are you married?
 - A. yes
 - B. no
 9. Do you have any children?
 - A. yes
 - B. no
 10. Other than the normal military training - Academy, OTS, ROTC, SOS by correspondence, Basic Military Training, or NCO Leadership School; have you ever received any type of formal leadership or management training?
 - A. yes (this could include AFIT, AFIT/CI, or other civilian programs)
 - B. no
 11. What is the source of your Commission?
 - A. Academy
 - B. OTS
 - C. ROTC
 - D. Other
-

The purpose of the next portion of this survey is to define a level of performance of real-world, outstanding, experienced leaders and managers. You are to recall to your mind the people in your past experience who have demonstrated the most outstanding characteristics of leadership and management. In comparison to these outstanding leaders and managers, you are to compare your own capabilities. Taking into account your own experience, rank, and competence relative to a real-world reference in your life.

There are many skills and characteristics listed and it is expected that a less experienced person (such as yourself) would be equal or less effective than the best leader/manager in most instances. As a relatively young leader/manager you may not have experience with a particular skill and you would only be able to guess at your level of effectiveness, and so the answer may be rated at a minimum level.

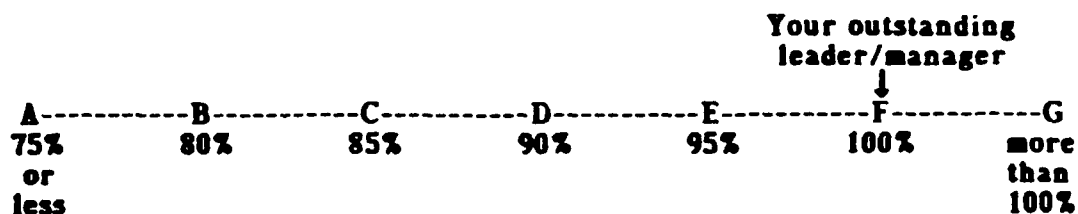
Rate yourself using the following guidelines. As a percentage, rate your present capability, at your regular job, to effectively use the skill described. For each question compare yourself to the person you have known who has most effectively used that particular skill. You may use a different reference person for each question.

Read each statement carefully and rate yourself. Use the scale listed at the top of the next page to answer all of the remaining questions. Rate yourself as accurately as possible by filling in the blank with the appropriate response. Note that the best person you know has been rated at 100%.



By comparison to the ideal leader/manager I . . .

12. . . . delegate important tasks and decisions to individuals in my work unit _____% as effectively as the ideal person.
13. . . . say things, inspiring and stimulating enthusiasm for the work of the group _____% as effectively as the ideal person.
14. . . . show friendly and supportive behavior toward work unit members _____% as effectively as the ideal person.
15. . . . create positive rewards and give praise or recognition to my work unit members with good performance showing appreciation for their special efforts and contributions _____% as effectively as the ideal person.
16. . . . enhance information flow from outside the work unit to the members of my work unit _____% as effectively as the ideal person.
17. . . . set specific, realistic performance goals, informing others of their duties and responsibilities, letting them know what is expected of them _____% as effectively as the ideal person.
18. . . . determine the training needs of my work unit members _____% as effectively as the ideal person.
19. . . . stay informed about the progress of activities within my work unit _____% as effectively as the ideal person.
20. . . . develop plans to avoid problems and develop procedures for reacting to unavoidable problems/crises _____% as effectively as the ideal person.
21. . . . represent my work unit, promoting or defending its interests. I do this when communicating with superiors, or other groups and individuals outside of my work unit _____% as effectively as the ideal person.
22. . . . facilitate cooperation and teamwork among the members of my work unit _____% as effectively as the ideal person.
23. . . . maintain regular correspondence (telephone, visits, social events, etc) with others who have contact with my work unit _____% as effectively as the ideal person.
24. . . . propose solutions to serious or unexpected work-related technical problems _____% as effectively as the ideal person.



By comparison to the ideal leader/manager I . . .

25. . . . say things to inspire and build others confidence in their ability to perform assignments successfully _____% as effectively as the ideal person.
26. . . . make sure credit is given to my work unit members for their helpful ideas and suggestions _____% as effectively as the ideal person.
27. . . . specify the rules and policies (written or unwritten) which must be observed by members of my work unit _____% as effectively as the ideal person.
28. . . . look out for the interests of others, providing helpful career advice, and aiding people in career advancement _____% as effectively as the ideal person.
29. . . . act decisively, to deal with technical work related problems when a prompt solution is needed _____% as effectively as the ideal person.
30. . . . check on the performance of my work unit members and their project successes _____% as effectively as the ideal person.
31. . . . efficiently organize and schedule short term work plans for my work unit in advance _____% as effectively as the ideal person.
32. . . . consult with the work unit and allow them to share in the decision making process _____% as effectively as the ideal person.
33. . . . maintain good relationships with superiors, peers, and outsiders in order to obtain necessary resources and support for my work unit _____% as effectively as the ideal person.
34. . . . promote identification within my work unit making each member a part of the group _____% as effectively as the ideal person.
35. . . . provide superiors, peers, and outsiders with important information from my work unit that could support their decision making process _____% as effectively as the ideal person.
36. . . . show sympathy and support when someone is upset _____% as effectively as the ideal person.
37. . . . provide a good role model by setting a good example of proper behavior through my actions _____% as effectively as the ideal person.
38. . . . promote and emphasize cooperation and cohesiveness within my work unit _____% as effectively as the ideal person.

39. From the following list choose the two skills that improved the most because of your time spent at SOS.

Place a **1** by the skill which had the **most positive improvement**.

Place a **2** by the skill which had the **next most positive improvement**.

- ___ **NETWORKING:** Socializing informally, developing contacts with people who are a source of information and support.
- ___ **SUPPORTING:** Acting friendly and considerate, showing support, aiding others career advancement.
- ___ **MANAGING CONFLICT AND TEAM BUILDING:** Fostering teamwork and cooperation, building identification within the organizational unit or team.
- ___ **MOTIVATING:** Appealing to emotions, values, or logic generating enthusiasm for the work and commitment to task. Setting a good example for behavior.
- ___ **RECOGNIZING AND REWARDING:** Providing praise and recognition for good performance; giving respect and appreciation for accomplishments.
- ___ **PLANNING AND ORGANIZING:** Determining long-range objectives and strategies to adapt to change, allocating resources, determining how to improve the organization.
- ___ **PROBLEM SOLVING:** Identifying work related problems and acting decisively to implement solutions.
- ___ **CONSULTING AND DELEGATING:** Encouraging suggestions for improvement, allowing others to carry out activities and handle problems.
- ___ **MONITORING OPERATIONS AND ENVIRONMENT:** Gathering information about the progress of the unit, constantly watching for threats and opportunities for the unit.
- ___ **INFORMING:** Providing relevant information transfer in and out of the work unit, promoting the unit and its reputation.
- ___ **CLARIFYING ROLES AND OBJECTIVES:** Assigning tasks and giving direction, communicating a clear understanding of responsibilities and expectations.

40. For the item you labeled #1, briefly explain what event(s) helped you to improve the most. These events may have occurred either in or out of class, formally or informally, on or off base.

41. For the item you labeled #2, briefly explain what event(s) helped you to improve the most. These events may have occurred either in or out of class, formally or informally, on or off base.

42. Go back to the list above and place an **X** by the skill which gained the **least improvement**. Briefly explain what you would change to improve the training in the area that you thought had the least improvement.

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Vita

Captain Gilbert W. Jennings was born on 1 July 1954 in Springfield, Illinois. He graduated from Athens Community High School in Athens, Illinois in 1973. In February 1978 he enlisted into the U.S. Air Force as an Aircraft Maintenance Specialist, Crew Chief. Selected by the Air Force in 1981, he returned to school under the Airman's Education and Commissioning Program. He attended Mississippi State University from June 1982 until December 1984, at which time he graduated with a Bachelor of Science Degree in Aerospace Engineering. Upon graduation from Mississippi State University he attended Officer Training School and received his commission in April 1985. His first assignment, as an officer, was to the Liquid Rocket Division of the Air Force Astronautics Laboratory, Edwards Air Force Base, California. He was later assigned to the laboratory's Strategic Defense Initiative Office (SDI) in 1987 where he was the Assistant Program Manager for all the laboratory's efforts on the Advanced Launch System, commonly known as ALS. Appointed Director of the SDI Special Projects Office in 1989, he was the focal point for many of the SDI technology programs at the laboratory. He directed all of the laboratory's SDI technology programs for space flight experiments, optical sensors, materials, structures, and small business innovative research programs. In May 1990 Captain Jennings entered the Graduate Systems Management program at the School of Systems and Logistics, Air Force Institute of Technology.

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